Hygeia, Greek Goddess of Health

Since the beginning of the practice of public health, the control of communicable disease has followed some basic principles:

Detection

Identification

Intervention

Click To Open ⇨ 2005 Annual Report ⇦ Click To Open

Bureau of Communicable Disease Control and Prevention

"When HEALTH is absent, wisdom cannot reveal itself, art cannot manifest itself, strength cannot be exerted, wealth becomes useless, reason becomes powerless."
Greek Physician and Philosopher
Herophilus, 300 BC

Matt Blunt, Governor
Julia M. Eckstein, Director
Missouri Department of Health and Senior Services

Acknowledgements

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Communicable Disease Surveillance 2005 Annual Report

Note: This report does **not** include a summary of sexually transmitted diseases, HIV, or environmental conditions.

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We thank our reviewers, Brian Quinn, Public Information Administrator, and
Dr. Bao-Ping Zhu, State Epidemiologist, for their thorough review and helpful comments.

Table of Contents

Missouri Profile

Population (2004)	5,754,618	Percent of Total Population
Urban	3,881,130	69.4%
Rural	1,714,080	30.6%

Live Births	78,547
Deaths	54,316

Sex	Population	
Male	2,810,852	48.8%
Female	2,943,766	51.2%

Race	Population	Percent of Total Population
White	4,957,166	86.1%
Black	680,336	11.8%
Other	117,116	2.0%

Age Group	Population	
<1	77,709	1.4%
1-4	293,760	5.1%
5-14	767,977	13.3%
15-24	834,405	14.5%
25-39	1,140,601	19.8%
40-64	1,874,474	32.6%
65+	765,692	13.3%

Region	Population	
Central	632,072	11.0%
Eastern	2,195,139	38.1%
Northwest	1,500,155	26.1%
Southeast	463,690	8.1%
Southwest	963,562	16.7%

Leading Causes of Death*:	Number of Deaths Reported	Percent of Total Deaths Reported
Heart disease	14,817	27.3%
Cancer	12,377	22.8%
Cerebrovascular disease (stroke)	3,316	6.1%
Chronic lower respiratory disease	3,063	5.6%
Unintentional injuries	2,806	5.2%
Alzeheimer's disease	1,631	3.0%
Diabetes	1,549	2.9%
Pneumonia and Influenza	1,544	2.8%

*Not all causes of death are listed.

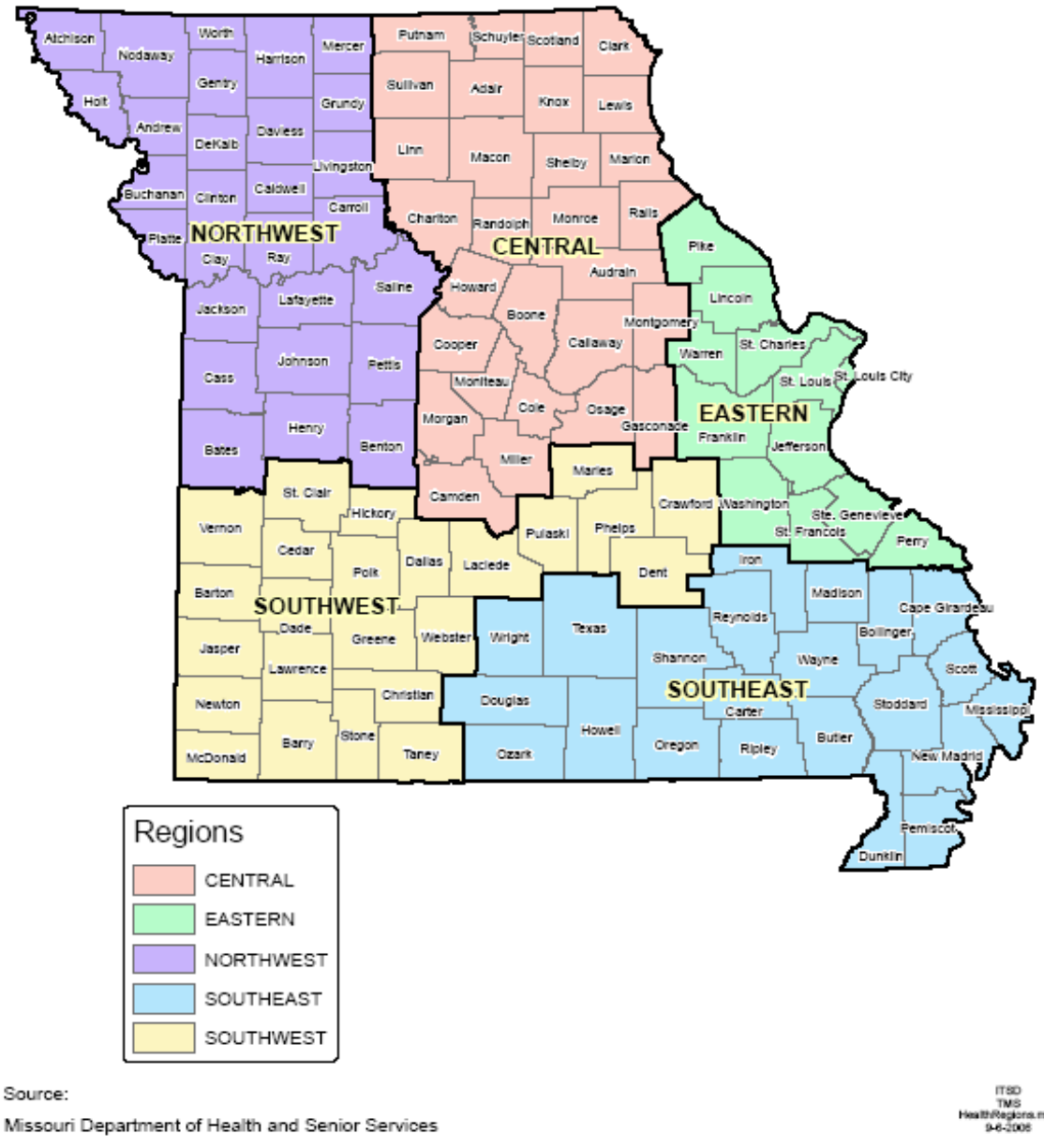
Data Provided by: Public Health Practice & Administrative Support Section, Bureau of Health Informatics, Department of Health and Senior Services.

Missouri is 69,697 square miles with slightly more than half of the population living in the two major cities, St. Louis and Kansas City, and their surrounding counties. Jefferson City is the capital. The state has 114 counties. The major flows of traffic within the state are from the east to west along the Missouri valley and southward along the Mississippi.

Although agriculture has remained important as an income-producing activity, services, manufacturing, and wholesale and retail trade have forged ahead since World War II. Manufacturing is led by the production of aerospace and transportation equipment, followed by the processing of food and the production of chemicals. Missouri also hosts the headquarters of the world's largest brewing company. Recreation and tourism have surpassed agriculture in economic importance, with more than seven million tourists a year visiting Branson's celebrity theaters and attractions.

"Missouri." Encyclopedia Britannica 2006. Encyclopedia Britannica Premium Service, 8 June 2006.

Missouri Disease Investigation / Emergency Response Regions



Source:
Missouri Department of Health and Senior Services

ITSD
TIMS
HealthRegions.mxd
9-6-2006

Introduction

The mission of the Bureau of Communicable Disease Control and Prevention (BCDCP) is to protect Missouri's citizens and visitors from the threats of infectious disease through the surveillance, investigation, prevention, and control of more than 80 communicable diseases and conditions of public health importance. The BCDCP, working with the local public health agencies (LPHAs), evaluates and responds to these reportable conditions as well as newly identified, such as SARS or monkeypox, and re-emerging infectious disease threats, such as pandemic influenza.

The services and activities provided by BCDCP include:

- monitoring communicable disease through data collection, analysis, and dissemination;
- coordinating and/or investigating communicable diseases and emerging disease cases (e.g., TB, pandemic influenza, monkeypox, SARS) to implement controls to prevent additional cases;
- assuring rapid response to public health emergencies, disease outbreaks, and natural disasters including bioterrorism events;
- providing consultation, assistance, and recommendations to local public health agencies, physicians, laboratories and others regarding changes to communicable disease reporting requirements and control measures for communicable diseases of public health importance;
- providing education and training on communicable diseases for public health professionals;
- providing information on infectious diseases to local public health jurisdictions, the medical community, and to the general public through press releases, interviews with the news media, pamphlets, reports, the Health Alert Network, the Department of Health and Senior Services (DHSS) web site and the CDCP ListServe.

The Department of Health and Senior Services (DHSS) rule for the **Reporting of Communicable, Environmental and Occupational Diseases**, (19 CSR 20-20.020). The BCDCP covers all diseases and conditions that are not addressed by the Bureau of HIV, STD and Hepatitis, or the Bureau of Environmental Epidemiology. Information and statistics for HIV, STD, and Hepatitis can be found by clicking on the appropriate bureau name. Data used in this report were gathered from disease and condition reports made by medical providers, laboratories, hospitals, local public health agencies, and others.

The information collected through 19 CSR 20-20.020 flows from the local public health jurisdictions to DHSS and on to the national Centers for Disease Control and Prevention (CDC). Data are linked to the national level through the CDC's National Electronic Telecommunications Surveillance System (NETSS). This information is critical for two reasons:

1. It enables public health agencies to act quickly to prevent the spread of disease and,
2. It provides an overall picture of disease trends at the local, state and national levels. Analyzing these trends allows us to target resources where they are most needed and to assess our effectiveness in preventing and controlling disease.

Introduction

There are limitations to the data provided in this report for the following reasons:

- sick people do not always seek healthcare, and
- healthcare providers and others do not always recognize, confirm or report notifiable conditions.

Therefore, reported cases may represent only a fraction of the actual burden of disease.

We are pleased to provide the following summary of the data reported in calendar year 2005. In addition to the contributors listed on the previous page, we would like to recognize the staff of our State Public Health Laboratories and the thousands of people in local health departments, clinics, hospitals and clinical laboratories throughout Missouri whose disease reports and efforts constitute the basis for this document. Without vigilant reporting of disease, targeted and effective prevention and control measures cannot be implemented.

While this report was compiled by the Missouri Department of Health and Senior Services, you should keep in mind that most of the public health workforce is in city or county health departments. Therefore, much of the work is at that level. The state, county and city health departments and their private sector partners work to promote health, protect against illness and injury, and render public health services to all people in Missouri.

A table of all reported notifiable diseases is located **here**. Where spatial analysis and use of Geographic Information Systems (GIS) was useful, maps have been provided to depict the data. Hyperlinks to additional information are included throughout the document.

We hope that you find this report informative and useful.

Harvey L. Marx, Jr.
Chief, Bureau of Communicable Disease Control and Prevention

"Without health there is no happiness. An attention to health, then, should take the place of every other object. — Thomas Jefferson, 1787

We invite your questions and comments on this report, "Communicable Disease Surveillance 2005 Annual Report".

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Executive Summary

Every year is busy for public health officials in Missouri, and 2005 proved to be no exception. Public health received over 33,600 reports of notifiable diseases and conditions in 2005. A variety of factors, including changes in the reporting rule, the occurrence of several large outbreaks, the adoption of new laboratory testing methods, and increased awareness of specific diseases among health care providers, all contributed to this year's total disease incidence.

Missouri is one of a few states to have an electronic disease registry that is accessible to its local public health agency partners statewide. It allows state and local public health communicable disease personnel to track, analyze, and generate reports for state and local morbidity. In 2005, MOHSIS became accessible using DSL. This increased efficiency of reporting and decreased the lag time that had existed for data entry into the system.

Our partners at the Missouri State Public Health Laboratory, with their highly trained laboratory scientists, provide expert consultation and a wide range of diagnostic and analytical services. These services include the identification of certain infectious diseases, genetic disorders and environmental health concerns, both in support of public health programs, and as a reference laboratory performing unusual or specialized procedures. Approximately 1.5 million testing procedures (many required by law) were performed in 2005 by the State Public Health Laboratory and the two branch laboratories, one in Poplar Bluff and the other in Mount Vernon. The State Public Health Laboratory also functions as a reference lab for medical laboratories in the state, and confirms results or completes organism identification.

In 2005, several additions were made to the list of communicable diseases and conditions that are reportable by law, including chronic hepatitis B and perinatal hepatitis B, Methicillin-resistant *Staphylococcus aureus* (nosocomial), Severe Acute Respiratory Syndrome (SARS), Shiga toxin positive (unknown organism), Vancomycin-resistant enterococci (nosocomial), Vancomycin-intermediate *Staphylococcus aureus*, and varicella (chickenpox). As a result of these changes to the reporting rule, efforts to prevent the transmission of hepatitis B from pregnant women to their unborn children were bolstered. Additionally, varicella cases from schools and other settings were reported and detected at a much higher rate than in previous years, which, in turn, helped provide more information about the effectiveness of varicella vaccine.

As chickenpox outbreaks peppered the state in 2005, the Kansas City metropolitan area experienced an unprecedented number of shigellosis cases. The Kansas City metropolitan area reported 819 cases, (the average number of cases over the previous five years was 87) thus eliciting a comprehensive public health response from state and local health departments, and the Centers for Disease Control and Prevention (CDC). The investigation and implementation of control measures, along with medical bills of cases, lost revenue from child care providers and lost wages of parents of cases, generated total estimated costs of over $1.5 million dollars. Additionally, residents of Southeastern Missouri endured a cryptosporidiosis outbreak in the summer of 2005, which pushed the annual incidence of this disease up to 4.3 cases per 100,000 population (well above the 2004 national average of 1.36 per 100,000, the most current year available). A case-control study indicated that child care attendance and recreational water use were risk factors for cryptosporidiosis during the outbreak period.

Executive Summary

In addition to increased contact with water, as the weather warms up and the great outdoors beckons, bites from a wide variety of insects and animals tend to increase. Over 4,500 reports of animal bites (to a human) were reported in 2005, mostly dogs and cats. As rabies has been isolated in several species in Missouri, 73 positive rabies submissions in 2005, this figure reflects the importance of vaccination of household pets to protect their owners and others from this fatal disease. Incidence of tularemia, a tick-borne disease that is naturally-occurring in Missouri, but recognized as a potential agent for bioterrorism, remained steady in 2005. The majority of tularemia cases were reported in the Southwestern region of the state. All reported cases of tularemia in Missouri were naturally-occurring. Reports of ehrlichiosis and Lyme-like disease were similar to the previous five years, but there was an increase noted in Rocky Mountain spotted fever incidence, which may be reflective of increased testing for this disease.

Increased awareness by health care providers and the use of new laboratory testing methods may have caused an increase in reporting of other infectious diseases, such as pertussis. Pertussis (whooping cough) continues to make a significant contribution to the communicable disease burden in Missouri. The 2005 pertussis incidence of 11.4 cases per 100,000 population was more than four times the state's median incidence reported in the previous five years, and also exceeded the national incidence of 9.2 per 100,000 reported by the CDC in 2004 (the latest national figure available).

In addition to addressing reports of communicable disease that are, to some degree, expected, a significant amount of time and effort was devoted to preparing for and responding to potential public health emergencies. In recent years, the U.S. has witnessed the global emergence of diseases that have increased in incidence or expanded in geographical range. Many of these have potentially serious human health and economic impacts, to include SARS, Mad Cow Disease, Ebola, Monkeypox, West Nile Virus (WNV), hantavirus, and specific limited strains of avian influenza; and the reemergence of multiple drug-resistant tuberculosis. Missouri has witnessed the emergence of Monkeypox and WNV in the state with more than two hundred cases (and 20 deaths) of WNV in the past five years.

Cases of tularemia and Q fever reported in 2005 were investigated promptly and thoroughly to rule out any association with acts of terrorism. State and local public health officials also continue to work on a coordinated response to an influenza pandemic, including the enhancement of a statewide syndromic surveillance system (scheduled for use in 2006).

Because many of the factors that foster the emergence and re-emergence of infectious diseases will continue – such as worldwide changes in land use, urbanization, trade globalization, and microbial adaptation – it is important for Missouri to maintain and continue to develop its capacity to respond to emerging microbial threats.

Many of the world's emerging infectious diseases are zoonoses. A zoonosis or zoonotic disease is one that normally exists in animals, but can infect humans. An "emerging" zoonosis is one that is newly recognized, or newly evolved, or that has occurred previously but shows an increase in incidence or expansion in geographical, host, or vector range.

Executive Sumamry

Nosocomial Infections are hospital-associated or healthcare-associated infections. The Centers for Disease Control and Prevention estimates that each year nearly two million patients in the United States contract infections in hospitals and about 90,000 of these patients die as a result of their infection.

Senate Bill 1279, also known as the "Missouri Nosocomial Infection Control Act of 2004" added Methicillin-resistant staphylococcus aureus (MRSA), nosocomial and vancomycin-resistant enterococci (VRE), nosocomial to the reportable disease list. Effective July 1, 2005, each hospital and ambulatory surgical center began reporting on a quarterly basis antibiogram data for infection, not colonization, from all body sites monitored by that health care facility. Reporting will include only a patient's first diagnostic nosocomial isolate per admission. Isolates from cultures performed for routine surveillance purposes are excluded from the requirement to report. This bill also requires the public reporting of specific types of nosocomial infections, such as: data on central-line associated blood stream infections in specific intensive care units, and data on the following surgical site infections; coronary bypass surgery, abdominal hysterectomies, and total hip surgery in hospitals and hernia and breast surgery in ambulatory surgery centers. Other process monitors will also be reported.

More detailed information about several of the diseases mentioned in this summary, including interpretations of findings and implications for future public health interventions, is provided in the following document.

Diseases/Conditions of Interest

Disease Outbreaks

The BCDCP maintains a database and provides on-site or technical assistance to the local public health agencies on reported outbreaks. We review outbreaks for lessons learned and any public health significance or new information on diseases and their modes of transmission, and provided data to CDC for national analysis.

Executive Summary

Diseases and Conditions	Number of Outbreaks
Gastrointestinal	
Acute Gastrointestinal Illness - etiology unknown	21
Clostridium difficile	2
Cryptosporidiosis	2
Giardiasis	3
Norovirus	4
Rotavirus	1
Salmonellosis	4
Shigellosis	8
Total	**45**
Respiratory	
Acute Respiratory Illness	3
Influenza and Influenza-like Illness	12
Tuberculosis	1
Total	**16**
Total Outbreaks	**103**

Diseases and Conditions	Number of Outbreaks
Vaccine Preventable	
Chickenpox	19
Hepatitis A	1
Pertussis	10
Total	**30**
Other	
Acute febrile illness	1
Hand-foot-and-mouth disease	1
Methicillin-resistant Staphylococcus aureus	3
Rash Illness	1
Ringworm	1
Scabies	2
Staph Toxin	1
Strep Group A	1
Vancomycin-resistant enterococci	1
Total	**12**

Disease Trends

There are several notable decreasing and increasing disease trends as reflected in the 15 year report.

Decreasing Trends

- Hepatitis A, with 32 cases reported for 2005, is at the lowest for the past 15 years. For 2004, a total of 34 cases were reported. In 1992 we reported 1,500 cases.
- Lyme Disease, with 17 cases reported in 2005, is at the lowest since 1998, when 12 cases were reported. It is a decrease of 82% from 207 cases reported in 1992, the highest count for the past 15 years.
- Tuberculosis (TB) Disease decreased approximately 42% from 260 cases in 1995 to 108 cases reported for 2005. For additional information on TB, click here.

Increasing Trends

- Animal Rabies, with 73 cases reported for 2005, increased 260% from 28 cases reported in 1991. For additional information on animal rabies, click here.
- Cryptosporidiosis, with 246 cases reported for 2005 has increased more than 794% since becoming reportable in 1995. For additional information on cryptosporidiosis, click here.
- Pertussis has shown an increase of over 1,000% from 59 cases reported in 1998 to 656 reported for 2005. For additional information on pertussis, click here.
- Rocky Mountain spotted fever (RMSF), with 128 reported in 2005, has increased by 512% from 25 cases in 1991. A record low was reported in 1998 with only five cases. For additional information on RMSF, click here.
- Shigellosis increased to 1,017 cases in 2005. This is a 400% growth from 1991 when 259 cases were reported, and a 553% increase from 2004, when only 184 cases were reported. For additional information on shigellosis, click here.

Section A - Communicable Disease Surveillance

Comparataive Statistics, Reported Diseases, Missouri 2005

Reportable Diseases & Conditions entered into the Missouri Health Surveillance Information System (MOHSIS)	Case Count 2005	5-Year First Quartile	5-Year Median	5-Year Third Quartile	% Change from 5-Year Median
Animal Bites	4533	0	4408	0	2.84%
Blastomycosis	6	1	1	2	**
Botulism Infant	1	0	1	1	**
Brucellosis	1	1	1	3	**
Campylobacteriosis	714	628	690	694	3.48%
Chlamydia	22371	13949	16181	18510	38.25%
Cholera	1	0	0	0	**
Coccidioidomycosis	1	0	1	1	**
Creutzfeldt-Jakob Disease	2	2	2	2	**
Cryptosporidiosis	246	44	53	55	364.15%
Cyclosporiasis	2	0	0	0	**
E. coli O157:H7	75	69	84	98	-10.71%
E. coli Shiga Toxin+ (Non O157)	11	0	19	0	-42.11%
E. coli Shiga Toxin+ (Not Serogrouped)	12	0	7	0	71.43%
Ehrlichiosis HGE	3	8	10	18	-70.00%
Ehrlichiosis HME	38	31	45	50	-15.56%
Ehrlichiosis, Other or Unspecified	13	0	7	0	85.71%
Giardiasis	522	571	578	716	-9.69%
Gonorrhea	9455	8723	8792	8883	7.54%
Haemophilus influenzae, Invasive	37	21	23	38	60.87%
Hansen's Disease	3	0	0	1	**
Hemolytic Uremic Syndrome	4	2	2	8	**
Hepatitis A	32	64	83	88	-61.45%
Hepatitis B, Acute	159	135	147	179	8.16%
Hepatitis B, Chronic	341	0	355	0	-3.94%
Hepatitis C, Acute	13	52	60	69	-78.33%
Hepatitis C, Chronic	3816	1515	1690	3138	125.80%
HIV Disease	516	513	519	553	-0.58%
Influenza	355	54	184	318	92.93%
Legionellosis	31	22	26	34	19.23%
Listeriosis	6	6	8	10	-25.00%
Latent Tuberculosis Infection (LTBI)	3227	4316	5001	5800	-35.47%
Lyme	17	37	42	47	-59.52%
Malaria	18	15	17	20	5.88%
Meningococcal Disease	28	49	49	58	-42.86%
Mumps	4	4	4	5	0.00%
Pertussis	656	107	146	176	349.32%
Q Fever	13	1	1	3	1200.00%
Rabies, Animal	73	43	50	50	46.00%
Rocky Mountain Spotted Fever	128	50	62	97	106.45%
Salmonellosis	801	653	712	846	12.50%
Shiga Toxin+ (Non E. coli/Unknown Organism)	5	0	0	0	**
Shigellosis	1017	231	324	361	213.89%
Strep pneumoniae, <5 Years, Invasive	11	0	18	0	-38.89%
Strep pneumoniae, Drug-Resistant, Invasive	37	5	11	16	236.36%
Streptococcal Disease, Group A Invasive	74	62	63	76	17.46%
Syphilis, Primary and Secondary	147	29	34	61	332.35%
Tetanus	2	0	0	0	**
Toxic Shock Syndrome (Strep)	3	1	2	3	**
Tuberculosis	108	127	130	136	-16.92%
Tularemia	27	27	28	28	-3.57%
Varicella (Chicken Pox)	480	0	0	0	**
Varicella (Chickenpox) Death Resulted	2	1	1	3	**
Vibriosis	1	0	1	2	**
West Nile Fever	13	0	9	0	44.44%
West Nile Viral Encephalitis/Meningitis	17	0	28	0	-39.29%
Yersiniosis	10	15	19	20	-47.37%

** Percent of change is unstable if either the 2005 case count, the median case count, or both are fewer than 10.
Data Source: Missouri Health Surveillance Information System.

Section A - Communicable Disease Surveillance

Cryptosporidiosis

Click to View
Spot Map
Relative Rate Map

Cryptosporidiosis or "Crypto" is a diarrheal disease caused by microscopic parasites of the genus *Cryptosporidium*.

Cryptosporidium is found in soil, food, water, or surfaces that have been contaminated with infected human or animal feces. If a person swallows the parasite they can become infected. One cannot become infected through contact with blood. Symptoms of Crypto include, most commonly, watery diarrhea and cramps, sometimes severe. Weight loss, nausea, vomiting, and fever are also possible. Some people with cryptosporidiosis may have no symptoms at all. The disease can be mild, but it can be a life threatening illness in people whose immune systems are already weakened by their diseases. Cryptosporidiosis is most particularly a danger for the immunocompromised, especially HIV-positive persons and persons with AIDS.

During the past two decades, cryptosporidiosis has become recognized as one of the most common causes of waterborne disease within humans in the United States. The parasite may be found in drinking water and recreational water in every region of the United States and throughout the world. Washing hands is the most effective means of preventing cryptosporidiosis transmission.

Table 1. Cryptosporidiosis—Comparative Statistics, by Socio-demographic Category, Missouri[1]

	Case Count: 2005	% of Total	Rate*: 2005	Median Case Count: 2000-2004	% Change from 5-Year Median
Total	246	100.0%	4.3	54	355.6%
Sex					
Male	120	48.8%	4.3	31	287.1%
Female	117	47.6%	4.0	23	408.7%
Unknown	9	3.7%	N/A	0	**
Race					
White	131	53.3%	2.6	35	274.3%
Black	2	0.8%	0.3	2	**
Other	1	0.4%	0.9	0	**
Unknown	112	45.5%	N/A	17	558.8%
Age Group					
<1	2	0.8%	2.6	3	**
1-4	66	26.8%	22.5	7	**
5-14	79	32.1%	10.3	21	276.2%
15-24	24	9.8%	2.9	3	**
25-39	31	12.6%	2.7	11	181.8%
40-64	33	13.4%	1.8	3	**
65+	11	4.5%	1.4	6	**
Region					
Central	3	1.2%	0.5	6	**
Eastern	56	22.8%	2.6	8	**
Northwest	37	15.0%	2.5	18	105.6%
Southeast	73	29.7%	15.7	4	**
Southwest	77	31.3%	8.0	18	327.8%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2004 population estimates provided by MDHSS, Bureau of Health Informatics.
**Percent of change is unstable if either the 2005 case count, the median case count, or both are fewer than 10.
Data Source: Missouri Health Surveillance Information System.

Section A - Communicable Disease Surveillance

Cryptosporidiosis - Continued

In 2005, there were 246 reported cases of confirmed or probable cryptosporidiosis for a rate of 4.3 per 100,000 population. In comparison to combined 2000-2004 median data, the rate of reported cryptosporidiosis throughout the state significantly increased by 356%. This increase is reflective of a large outbreak in the Southeast Region, which may have further contributed to increased case counts in neighboring regions (600% increase in the Eastern Region and a 328% increase in the Southwest Region). Of the 246 cases reported, 73 (29.7%) were from the Southeast Region. Epidemiological analysis of the outbreak suggests that attendance at a day care center was a predisposing risk factor for cryptosporidiosis.

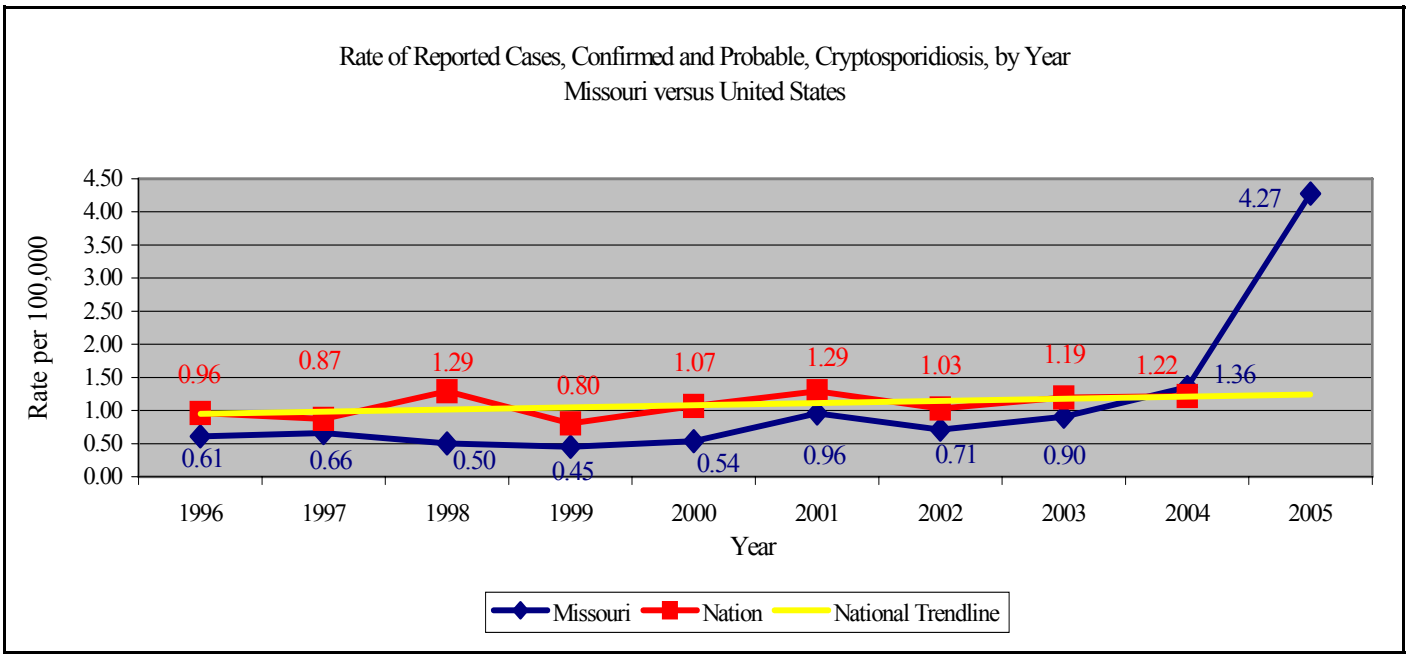
Individuals 14 years of age or younger accounted for 60% of all reported cases in Missouri for 2005. A case-control study performed during the outbreak that occurred in the Southeast Region revealed a significant relationship between the occurrence of cryptosporidiosis, the individual's age, childcare exposure and recreational water use. It was discovered through the Southeast Region investigations that day care centers often take children swimming during the summer months. For epidemiological purposes this makes it difficult to discern which exposure (day care attendance or recreational water use) was more closely associated with infection. However, these findings underscore the importance of public education targeting these risk groups and the possibility of transmission in these type of settings. Further findings suggest that closing municipal pools altogether may have a negative impact on the situation, as individuals will go elsewhere to swim. Cases may have been prevented in this instance if hyperchlorination had occurred and the pool had been reopened. Public education targeting these risk groups also included the following:

- Wash hands thoroughly with soap and water.
- Do not swallow recreational water. *Cryptosporidium* can survive for days in swimming pools with adequate chlorine levels.
- Do not drink untreated water from shallow wells, lakes, rivers, springs, ponds, and streams.
- Do not drink untreated water during community-wide outbreaks of disease caused by contaminated drinking water.
- Do not use untreated ice or drinking water when traveling in countries where the water supply might be unsafe.
- Wash and/or peel all raw vegetables and fruits before eating.
- Use safe, uncontaminated water to wash all food that is to be eaten raw.
- Avoid eating uncooked foods when traveling in countries with minimal water treatment and sanitation systems.

Section A - Communicable Disease Surveillance

Cryptosporidiosis - Continued

Comparison to National Data: The annual rate of reported cryptosporidiosis has fluctuated between 0.96 and 1.36 from 1996 to 2004. After declining to 0.45 in 1999, it has shown a steady increase for two years thereafter with the 2004 rate surpassing the highest national rate (1.36). Prior to this, Missouri's rate had been lower than the national rate for the past decade. As stated earlier, this increase is probably due to a large outbreak that occurred in the Southeast Region.



Additional Website Resources

CDC Health Topics
CDIRM
Health Region Defined

Section A - Communicable Disease Surveillance

Haemophilus influenza (Invasive) Disease

Haemophilus influenzae (*H. influenzae*) is a cause of bacterial infections that are often severe, particularly among infants. Six capsular types of *H. influenzae* (a-f) have been identified. Invasive infection occurs when the *H. influenzae* enters the bloodstream from the nasopharynx, where the organism colonizes a small percentage of young children (how this occurs is unknown). The bacteria can then spread to other parts of the body, and cause infections in the meninges, epiglottis, joints, or bones.

Before the introduction of effective vaccines, *H. influenzae* type b (Hib) was the leading cause of bacterial meningitis and other invasive bacterial disease among children younger than 5 years of age. Approximately two-thirds of all Hib cases occurred among children younger than 18 months of age.

Currently, all *H. influenzae*, invasive disease (i.e. organism recovered from a normally sterile body site) are reportable in Missouri. The purpose of conducting surveillance on all *H. influenzae*, invasive disease is to promote submission of isolates for serotyping. This will enhance identification of Hib, which is the only serotype that is potentially vaccine-preventable. In addition, we are characterizing the epidemiology of non-type b infections. Thirty-seven cases of *H. influenzae* invasive disease were reported in 2005 for a rate of 0.6 cases per 100,000. In comparison to the 5 year median (for the period 2000-2004), invasive *H. influenzae* disease increased 60.9%. However, no cases of *H. influenzae*, type b were reported in 2005.

Table 1. *Haemophilus influenza*—Comparative Statistics, by Socio-demographic Category, Missouri[1]

	Case Count: 2005	% of Total	Rate*: 2005	Median Case Count: 2000-2004	% Change from 5-Year Median
Total	37	100.0%	0.6	23	60.9%
Sex					
Male	18	48.6%	0.6	10	80.0%
Female	17	45.9%	0.6	13	30.8%
Unknown	2	5.4%	N/A	0	**
Race					
White	20	54.1%	0.4	17	17.6%
Black	2	5.4%	0.3	3	**
Other	0	0.0%	0.0	0	**
Unknown	15	40.5%	N/A	3	**
Age Group					
<1	3	8.1%	3.9	2	**
1-4	5	13.5%	1.7	2	**
5-14	2	5.4%	0.3	1	**
15-24	1	2.7%	0.1	0	**
25-39	4	10.8%	0.4	1	**
40-64	3	8.1%	0.2	7	**
65+	19	51.4%	2.5	10	90.0%
Region					
Central	3	8.1%	0.5	0	**
Eastern	14	37.8%	0.6	7	**
Northwest	14	37.8%	0.9	11	27.3%
Southeast	2	5.4%	0.4	1	**
Southwest	4	10.8%	0.4	4	**

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2004 population estimates provided by MDHSS, Bureau of Health Informatics.
**Percent of change is unstable if either the 2005 case count, the median case count, or both are fewer than 10.
Data Source: Missouri Health Surveillance Information System.

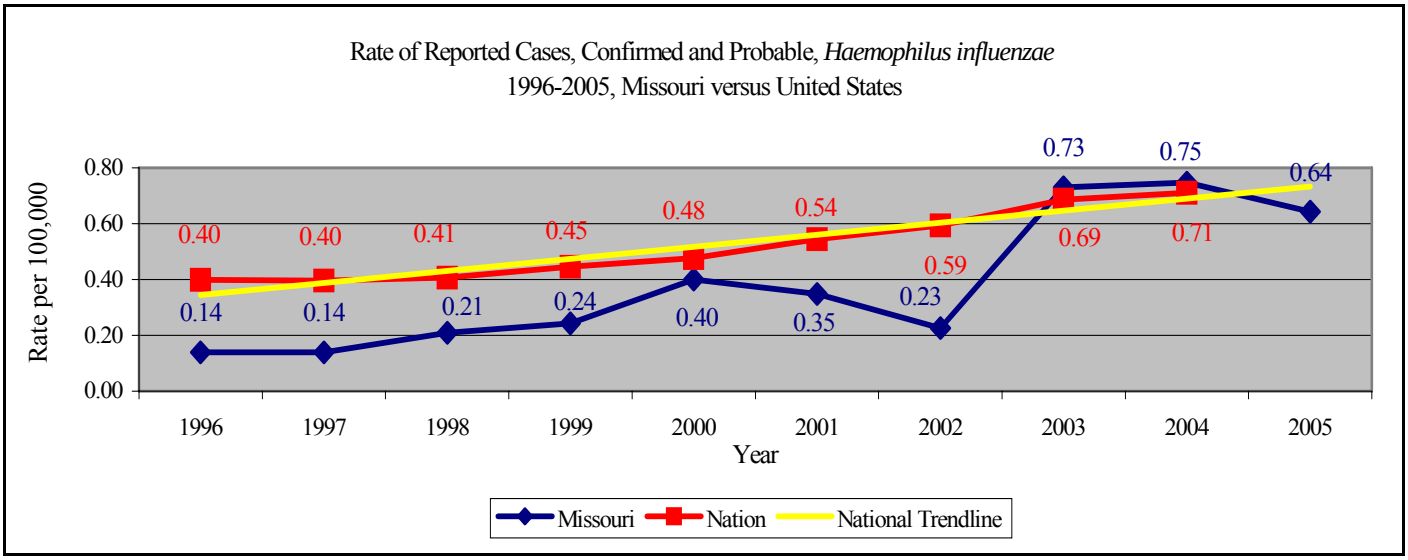
Section A - Communicable Disease Surveillance

Haemophilus Influenza (Invasive) Disease - Continued

Eight cases of *H. influenzae,* invasive disease occurred in children less than 5 years of age, and nineteen cases occurred in adults 65 years of age and over. Distribution of cases throughout the State is consistent with the distribution of the population in Missouri.

Since the introduction of Hib conjugate vaccines, the incidence of invasive Hib in infants and young children has decreased by 99% in children younger than 5 years of age. The incidence of invasive infections caused by all other typeable and nontypeable strains combined, is similarly low. Generally, invasive Hib disease occurs primarily in under immunized children and among infants too young to have completed the primary immunization series. More than 95% of infants will develop protective antibody levels after a primary series of two or three doses of vaccine. Invasive Hib disease in a completely vaccinated infant is uncommon.

Comparison to National Data: Missouri's trend has been very similar to the national rate since 2003. However, in 2005 incidence dipped slightly below the national average.



Additional Website Resources

CDC Health Topics
CDIRM
Health Region Defined

[1]Centers for Disease Control and Prevention. Haemophilus Influenzae type B. In: Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Hamborsky J, Wolfe S, eds. 8th ed. Washington DC: Public Health Foundation, 2004.

Section A - Communicable Disease Surveillance

Pertussis

Click to View
Spot Map
Relative Rate Map

Pertussis (whooping cough) is an infection of the respiratory tract that is caused by the bacteria *Bordetella pertussis*. The disease is characterized by a severe cough of prolonged duration (from 14 days to several months) with bouts of "coughing fits" (paroxysms) that can make catching one's breath difficult, and may be followed by a whooping noise with inspiration, and posttussive vomiting. Both paroxysms and the characteristic whoop may be absent in adults and adolescents, children under six months of age, and vaccinated children, making the disease more difficult to diagnose clinically in this population.

Before the availability of vaccine in the 1940's, pertussis was a common childhood disease in the United States, with high mortality in infants and young children. Since the introduction of vaccine, pertussis incidence gradually decreased, however, the US has seen a gradual increase in pertussis incidence beginning in the early 1980s, see Rate of Reported Cases, Confirmed and Probable, Pertussis, 1996-2005, Missouri vs. United States.

Statewide in 2005, Missouri recorded 656 confirmed and probable cases of pertussis. This represents a statewide incidence rate of 11.4 per 100,000, more than 4 times the median incidence rate for the previous 5 years of 2.5 per 100,000.

Although Eastern region reported the highest number of cases (see Table) and has 38.1% of Missouri's population, it has a similar incidence rate to Southeast region, which only accounts for 8.8% of Missouri's population. Outbreaks in schools were reported in both of these regions and may present one reason for such similar rates.

Table 1. Pertussis—Comparative Statistics, by Socio-demographic Category, Missouri[1]

	Case Count: 2005	% of Total	Rate*: 2005	Median Case Count: 2000-2004	% Change from 5-Year Median
Total	656	100.0%	11.4	146	349.3%
Sex					
Male	288	43.9%	10.2	66	336.4%
Female	341	52.0%	11.6	80	326.3%
Unknown	27	4.1%	N/A	0	**
Race					
White	346	52.7%	6.9	111	209.9%
Black	56	8.5%	8.2	20	180.0%
Other	2	0.3%	1.7	11	**
Unknown	252	38.4%	N/A	4	**
Age Group					
0-2 months^	80	12.2%	412.3	49	63.3%
3-6 months^	53	8.1%	197.7	29	82.8%
7-11 months^	12	1.8%	38.1	5	**
1-4 years	77	11.7%	25.9	21	266.7%
5-9 years	100	15.2%	25.1	12	733.3%
10-14 years	116	17.7%	28.1	10	1060.0%
15-19 years	54	8.2%	13.1	6	**
20+ years	164	25.0%	4.1	14	1071.4%
Region					
Central	58	8.8%	9.2	2	**
Eastern	313	47.7%	14.3	80	291.3%
Northwest	185	28.2%	12.3	31	496.8%
Southeast	58	8.8%	12.5	28	107.1%
Southwest	42	6.4%	4.4	5	**

[1]Socio-demographics are missing for some cases.
^ Rates calculated per 100,000 using 2004 live birth counts provided by MDHSS, Bureau of Health Informatics.
*All rates are calculated per 100,000 using 2004 population estimates provided by MDHSS, Bureau of Health Informatics.
**Percent of change is unstable if either the 2005 case count, the median case count, or both are fewerr than 10.
Data Source: Missouri Health Surveillance Information System.

Section A - Communicable Disease Surveillance

Pertussis - Continued

The age group most likely to suffer from complications of pertussis and to be hospitalized is the zero to 11 months age group, which accounted for 21% of all cases reported in Missouri in 2005. The highest pertussis incidence rates were among infants who were zero to two months of age (360.8 per 100,000, 70 cases). This is consistent with the fact that the youngest population of infants is highly susceptible to this disease, as they are not eligible for pertussis vaccination until two months of age (except in outbreak situations).

Interesting (and not unexpected) was the number of cases reported in the 10-14 year age group which represented 17.7% of all reported cases and the 15-19 year age group with 8.2% of all reported cases. When combined, creating a new 10-19 year age group, this group accounted for 25.9% of all cases, which is indicative of waning immunity and higher susceptibility to disease. The adult population (ages 20 years or greater) contributed to 25% of all cases in the state, which may be a result of better surveillance (higher detection and reporting), as well as waned immunity in previously vaccinated individuals.

The upward trend of pertussis in the U.S. and the increased incidence of the disease in the state may be due to a combination of the following factors:

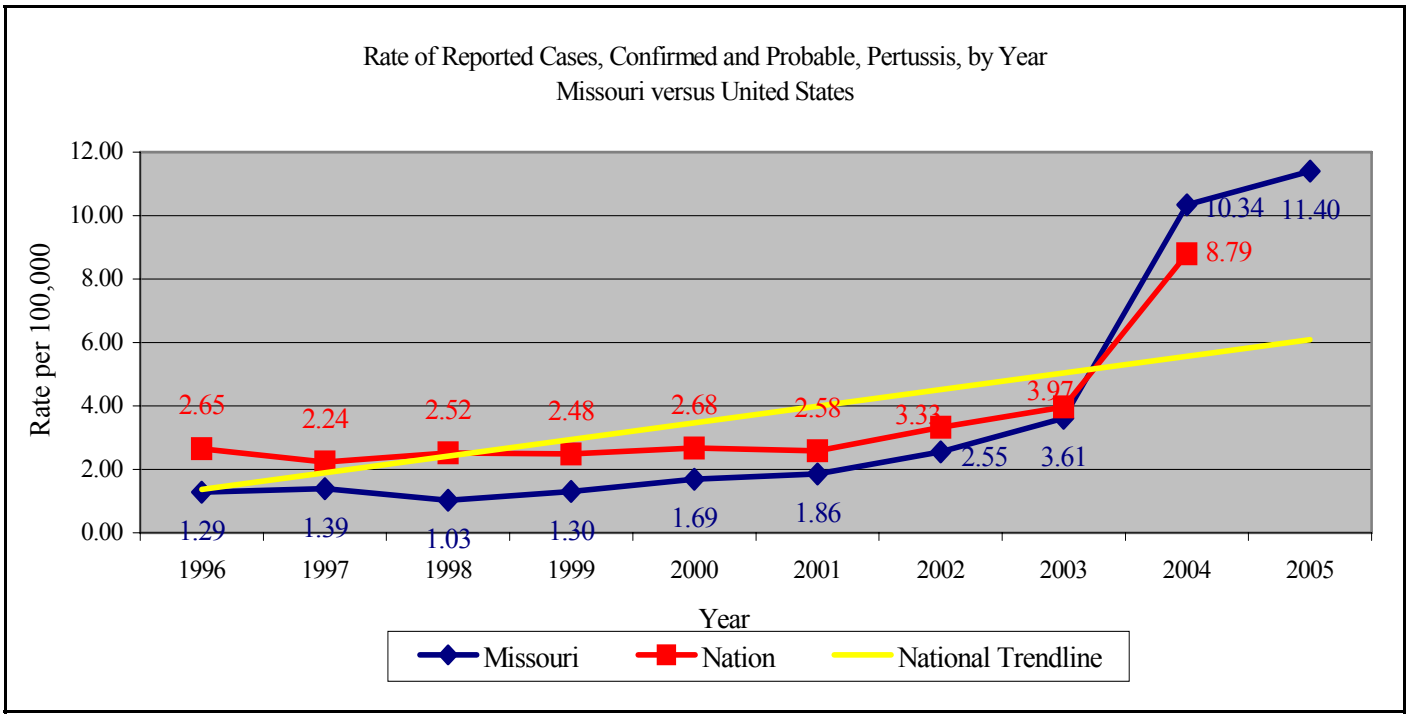
- Increased awareness of the disease and the availablity of Polymerase Chain Reaction (PCR) testing for diagnosis of pertussis.
- Vaccine failure or lower vaccine efficacy (pertussis vaccine efficacy ranges from as low as 65% to as high as 95%, depending on the vaccine and study population. The mean vaccine efficacy is 85%, which means that 15 out of every 100 fully vaccinated children will never develop full immunity to pertussis, and will therefore remain susceptible to the disease.
- Incomplete vaccination coverage in the susceptible population.
- An actual or true increase in the incidence of disease due to higher endemicity (the cyclic peaks) of pertussis.
- Waning childhood immunity.
- Better detection and reporting of the disease, especially in older adolescents and adults (a function of enhanced surveillance), due partly to increased awareness among providers about pertussis in vaccinated adolescents and adults.

Section A - Communicable Disease Surveillance

Pertussis - Continued

The rate of pertussis in the United States has generally shown a slight increase over the past decade. That increase became much more pronounced beginning in 2002. Missouri's rate, although lower than the National rate, has followed much the same pattern, trending steadily upward beginning in 2000.

With a quadrupling of the rate seen during the previous five years from an average of 2.26 to 10.34 in 2004, Missouri moved well ahead of the National rate (8.79). This was the result of a number of regional outbreaks scattered across the state. This trend continued in 2005, with the statewide rate increasing to 11.4. National data for 2005 are not yet available. All rates are cases per 100,000 and are based on 2004 population estimates.



Additional Website Resources

CDC Health Topics
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Section A - Communicable Disease Surveillance

Q Fever

Click to View
Spot Map
Relative Rate Map

Q fever is a zoonotic disease caused by *Coxiella burnetii,* a species of bacteria that is distributed globally. It is a febrile illness usually accompanied by rigors, myalgia, malaise, and retrobulbar headache. Severe disease can also include acute hepatitis, pneumonia, and meningoencephalitis. The bacterium that causes Q fever is a long-lived, a highly infectious disease agent, and has been classified as a potential biological agent. Many human infections are inapparent, however, unrecognized or untreated, Q fever may cause long-term heart or liver damage.

Table 1. Q Fever—Compartative Statistics, by Socio-demographic Category, Missouri[1]

	Case Count: 2005	% of Total	Rate*: 2005	Median Case Count: 2000-2004	% Change from 5-Year Median
Total	13	100.0%	0.2	1	**
Sex					
Male	8	61.5%	0.3	1	**
Female	5	38.5%	0.2	0	**
Unknown	0	0.0%	N/A	0	**
Race					
White	10	76.9%	0.2	1	**
Black	0	0.0%	0.0	0	**
Other	0	0.0%	0.0	0	**
Unknown	3	23.1%	N/A	0	**
Age Group					
<1	0	0.0%	0.0	0	**
1-4	0	0.0%	0.0	0	**
5-14	0	0.0%	0.0	0	**
15-24	2	15.4%	0.2	0	**
25-39	1	7.7%	0.1	1	**
40-64	7	53.8%	0.4	0	**
65+	3	23.1%	0.4	0	**
Unknown	0	0.0%	N/A	0	**
Region					
Central	0	0.0%	0.0	0	**
Eastern	4	30.8%	0.2	0	**
Northwest	4	30.8%	0.3	1	**
Southeast	1	7.7%	0.2	0	**
Southwest	4	30.8%	0.4	0	**

[1]Socio-demographic are missing for some cases.
*All rates are calculated per 100,000 using 2004 population estimates provided by MDHSS, Bureau of Health Informatics.
**Percent of change is unstable if either the 2005 case count, the median case count, or both are fewer than 10.
Data Source: Missouri Health Surveillance Information System.

Cattle, sheep, and goats are the primary reservoirs of *C. burnetii*. Infection has been noted in a wide variety of other animals, including other species of livestock and in domesticated pets. *Coxiella burnetii* does not usually cause clinical disease in these animals, although abortion in goats and sheep has been linked to *C. burnetii* infection. Organisms are excreted in milk, urine, and feces of infected animals. Most importantly, during birthing the organisms are shed in high numbers within the amniotic fluids and the placenta. The organisms are resistant to heat, drying, and many common disinfectants. These features enable the bacteria to survive for long periods in the environment. Infection of humans usually occurs by inhalation of these organisms from air that contains airborne barnyard dust contaminated by dried placental material, birth fluids, and excreta of infected herd animals. Airborne particles containing *C. burnetii* may be carried downwind for a kilometer or more. Wool, straw, fertilizer and laundry may be also become contaminated with *C. burnetii* from infected animals. Humans are often very susceptible to the disease, and very few organisms may be required to cause infection.

Section A - Communicable Disease Surveillance

Q Fever - Continued

Ingestion of contaminated milk may be responsible for some cases. Other modes of transmission to humans, may include tick bites, direct person-to-person transmission occurs rarely, however contaminated clothing may be a source of infection.

Statewide in 2005, Missouri reported 13 confirmed and probable cases of Q Fever. This represents a statewide incidence rate of 0.2 cases per 100,000, which is more than 13 times the median incidence rate for the previous five years. A recent study on the epidemiology of the disease suggested that increases in Q fever reports may be attributed to increased exposure opportunities to farm animals and pets, travel to the countryside and involvement in outdoor activities, as well as urbanization of rural areas.

Since Q fever is a potential biological agent, reports of suspected *C. burnetii* infections are promptly investigated in a cooperative effort between DHSS and local public health agencies. Investigators ruled out bioterrorism for all of the 2005 reports. Missouri's Q Fever cases likely resulted from exposure to infected animals or soils harboring *C. burnetii*.

Two apparent clusters were observed from reported Q Fever cases in 2005. Within each cluster, the patients shared a geographical link, this was observed between the three cases reported from Franklin County in eastern Missouri, and between the three cases reported from Harrison County in northwest Missouri. The two cases reported from Greene County in southwest Missouri did not appear to be connected epidemiologically.

Although investigators were not able to discover the source of exposure for the individuals reported from Franklin and Harrison Counties, it is worth mentioning that within each cluster, two of the three individuals worked with sheep and/or cattle, a well-documented risk factor for Q Fever.

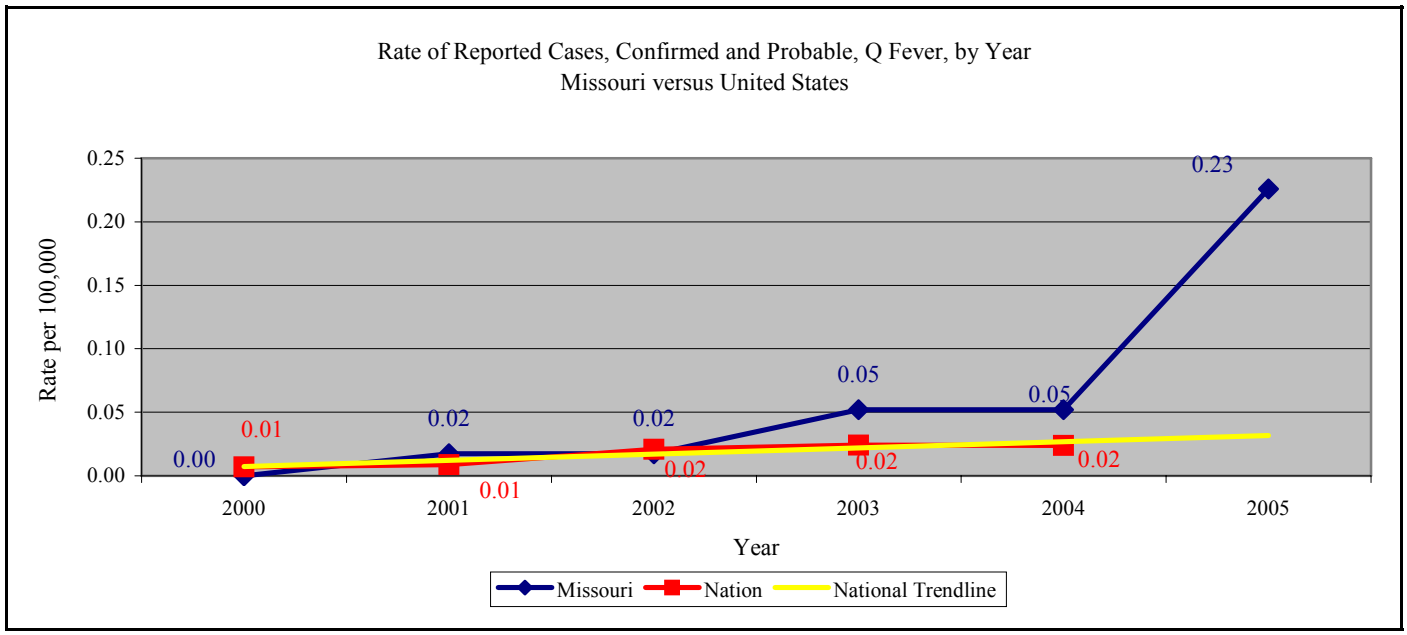
Three other cases reported in 2005, were in persons with occupations that involved outdoors and/or livestock exposure. One of these individuals worked near a petting zoo, cited in a US Centers for Disease Control and Prevention report as a public venue where intervention is necessary to prevent transmission of Q Fever (as well as other zoonotic diseases)[1].

[1] "Compendium of measures to prevent disease associated with animals in public settings. National Association of State Public Health Veterinarians, Inc. MMWR Recomm Rep. 2005 Mar 25;54(RR-4):1-12.

Section A - Communicable Disease Surveillance

Q Fever - Continued

Since becoming a reportable condition in 2000, Q Fever in Missouri has essentially matched the National trend through 2004, (as of this report, National data was not available for 2005). In 2005, Missouri experienced an increase in reported cases, in part due to the two clusters previously discussed in this report.



Additional Website Resources

CDC Health Topics
CDIRM
Health Region Defined

Section A - Communicable Disease Surveillance

Rabies, Animal

Click to View
Positives Map
Wild Specimens Map

Rabies is a fatal viral illness that affects both animals and humans. Laboratory testing for rabies is useful for confirmation of the virus' presence in certain species, and for determination of the need to administer rabies prophylaxis in cases of human exposure to a potentially rabid animal. Surveillance for this disease in the domestic and wild animal population is a valuable tool in the prevention of human rabies cases.

During 2005, 73 cases of animal rabies were detected in Missouri, compared to 59 cases the previous year, representing a 24% increase (Table 1). Animals found to be rabid in Missouri during 2005 included: bats (54 cases); skunks (17 cases); dogs (1 case); and horses (1 case). The number of specimens tested in 2005 was 2,594, with 73 found positive, giving a positivity rate of 2.81%. In 2004, 59 of 2,352 submitted specimens tested positive, yielding a 2.51% positivity rate. The annual number of rabies cases during the preceding ten years (1995-2004) ranged from a low of 26 cases in 1996 to a high of 59 cases in 2004. The median number of cases per year during this time period was 41.

Table 1—Animal Rabies, by Species, Missouri 2005

Species	# Examined	# Positive	% Positive
Bat	1003	54	5.38%
Cat	589	0	0.00%
Cow	26	0	0.00%
Dog	600	1	0.20%
Exotic	1	0	0.00%
Fox	12	0	0.00%
Horse	19	1	5.26%
Other Domestic	9	0	0.00%
Other Wild	45	0	0.00%
Raccoon	141	0	0.00%
Rodent/Rabbit	104	0	0.00%
Skunk	45	17	37.80%
Total	2594	73	2.81%

*The 2005 count of 73 positive rabies cases is a 62% increase from the five-year-median.
**Howell and Douglas Counties were on alert for seven and six months, respectively. Phelps County was on alert beginning the month of December 2005.
***Counties are placed on alert when there is a positive result in a domestic animal or when threshold levels for wild animals have been exceeded.

Wild and domestic animals are tested for rabies only when they have potentially exposed a person or pet, or in other situations with possible public health implications. In 2005, specimens were submitted in a representative fashion from all regions of the state, with the exception of the Southeast Region where only 13 of 22 (59%) counties submitted specimens (Wild Specimens Map). Rabies in bats occurs sporadically across Missouri (Positives Map), while rabies in skunks is usually confined to about the southern one-third of the state. Both the north-central and south-central variants of the skunk rabies virus are found in rabid skunks in Missouri.

A county is placed under a "rabies alert" when a positive domestic animal is detected in that county, or when the threshold level for rabid wild animals is exceeded. Three counties were placed under alerts in 2005. Howell County was placed under a seven-month alert beginning April 1, 2005 due to an excessive number of rabid skunks. Douglas County was placed under a six-month alert beginning May 11, 2005 when a rabid horse was detected. Phelps County was placed under an alert on December 16, 2005 due to a rabid dog.

Human rabies in Missouri is uncommon, with the last case reported in 1959. The low frequency of cases does not mean rabies is not a threat. To the contrary, this major public health victory is directly attributable to an effective

Section A - Communicable Disease Surveillance

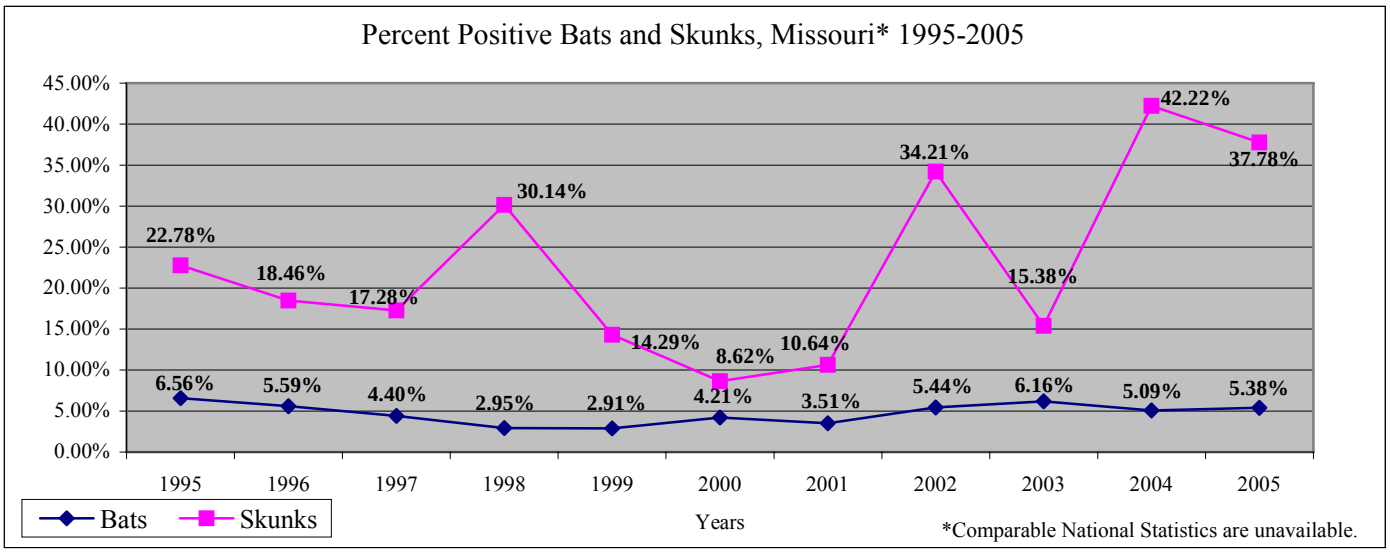
Rabies, Animal - Continued

medical preventive regimen (i.e., anti-rabies shots), improved public health practices (e.g., animal quarantine/testing, prompt investigation of animal bite incidents by local public health agencies), and improved rabies vaccinations for dogs and cats.

The percent of bats that test positive for rabies does not fluctuate greatly from year to year, ranging from about 3 to 7 percent from 1995 – 2005. This correlates closely with the experience of other states, even during periods when bat rabies is "epizootic." The percent positive can presumably reach somewhat higher levels in a smaller geographic region (e.g., in a given city or county), but it would be unusual to vary substantially from statewide levels in the long term. Bats remain the major source of exposure for humans since their bites can seem insignificant or go unnoticed, and because they often find their way into living quarters due to their small size.

The percent of skunks that test positive for rabies fluctuates significantly as environmental and skunk population factors vary, making transmission of this virus more easily accomplished. This is also consistent with national trend data. In Missouri, percent positive rates varied from about 9 to 42 percent during the period 1995 – 2005. Public health authorities should notify citizens when rates begin to climb above "normal" levels, since rabies in a terrestrial species like the skunk is more likely (than bat rabies) to be transmitted to other terrestrial species such as livestock, dogs, and cats.

Other wild and domestic species of animals in Missouri are found to be rabid each year. Although they are of public health significance, their relatively low numbers does not make calculation of percent positive rates statistically meaningful over long periods of time.



Additional Website Resources

CDC Health Topics | CDIRM | Health Region Defined

Section A - Communicable Disease Surveillance

Rocky Mountain Spotted Fever (RMSF)

Click to View
Spot Map
Relative Rate Map

RMSF is a zoonotic disease caused by a genus of bacteria called "rickettsia". RMSF is a tickborne febrile illness most commonly characterized by acute onset and usually accompanied by myalgia, headache, and petechial rash, mostly on the palms and soles. RMSF is the most severe and most frequently reported rickettsial illness in both Missouri and the United States. The disease can be difficult to diagnose in the early stages, and without prompt and appropriate treatment, it can be fatal. In spite of its name, the highest incidences of RMSF in the United States occur in the mid-southern states of Oklahoma, North Carolina, South Carolina, Arkansas, and Missouri.

Table 1. RMSF—Comparative Statistics, by Socio-demographic Category, Missouri[1]

	Case Count: 2005	% of Total	Rate*: 2005	Median Case Count: 2000-2004	% Change from 5-Year Median
Total	128	100.0%	2.2	62	106.5%
Sex					
Male	63	49.2%	2.2	40	57.5%
Female	62	48.4%	2.1	22	181.8%
Unknown	3	2.3%	N/A	0	**
Race					
White	78	61.0%	1.6	32	140.6%
Black	2	1.5%	0.3	1	**
Other	0	0.0%	0.0	0	**
Unknown	48	37.5%	N/A	29	69.0%
Age Group					
<1	0	0.0%	0.0	0	**
1-4	4	3.1%	1.4	2	**
5-14	8	6.3%	1.0	8	**
15-24	12	9.4%	1.4	3	**
25-39	31	24.2%	2.7	10	210.0%
40-64	52	40.6%	2.8	24	116.7%
65+	21	16.4%	2.7	15	40.0%
Region					
Central	11	8.6%	1.7	12	-8.3%
Eastern	8	6.3%	0.4	3	**
Northwest	50	39.1%	3.3	13	284.6%
Southeast	10	7.8%	2.2	13	-23.1%
Southwest	49	38.3%	5.1	21	133.3%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2004 population estimates provided by MDHSS, Bureau of Health Informatics.
**Percent of change is unstable if either the 2005 case count, the median case count, or both are fewer than 10.
Data Source: Missouri Health Surveillance Information System.

Many zoonotic diseases require a biological vector (e.g., a mosquito, tick, flea, or mite) in order to transmit the disease to humans. In the case of RMSF, ticks are the transmitter of *Rickettsia rickettsii*, the agent that causes the disease. The major vectors of RMSF in Missouri are the American Dog Tick and the Rocky Mountain Wood Tick. Ticks transmit the disease primarily by their bite. Less commonly, infections may occur following exposure to crushed ticks or tick feces.

Rickettsiae are transmitted to the host through saliva while a tick is feeding. It usually takes several hours of attachment and feeding before the rickettsiae are transmitted to the host. The risk of exposure to a tick carrying *R. rickettsii* is low. In general, about 1%-3% of the tick population carries *R. rickettsii*, even in areas where the majority of human cases are reported.

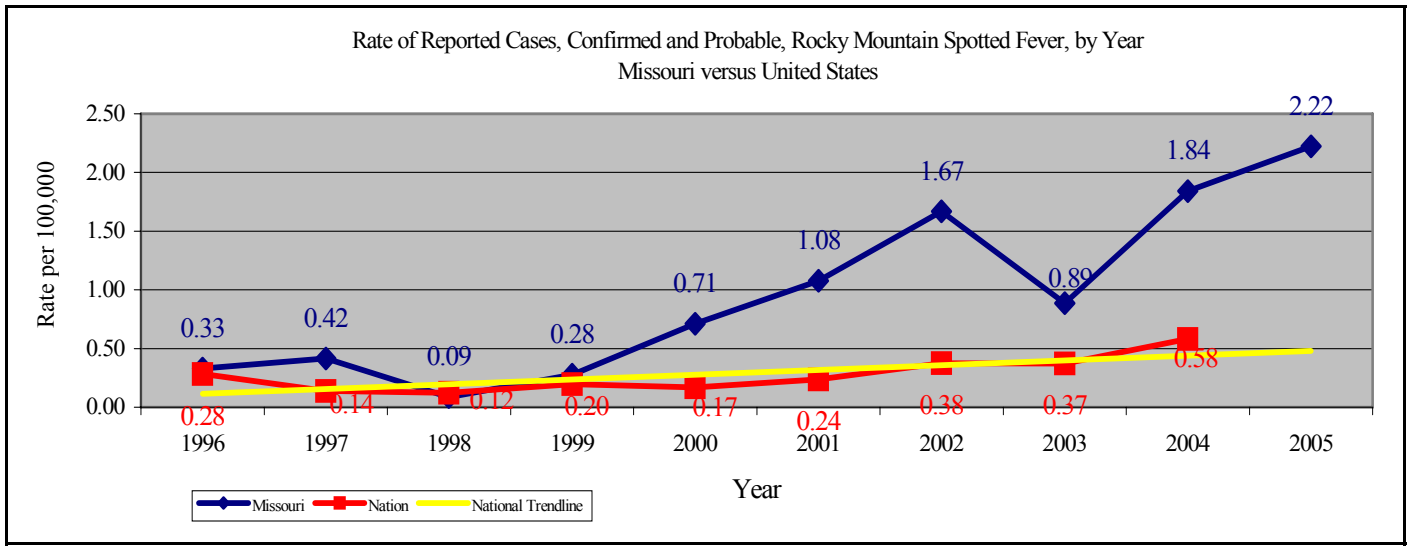
Section A - Communicable Disease Surveillance

Rocky Mountain Spotted Fever (RMSF) - Continued

Ticks become infected with *R. rickettsii* while feeding on blood from an infected host in either the larval, nymphal, or adult stage. These ticks can bite other animals, or people and pass Rocky Mountain spotted fever to them. Furthermore, male ticks may transfer *R. rickettsii* to female ticks during mating. A female tick can also transmit *R. rickettsii* to her eggs. Once infected, a tick can carry the pathogen for life.

Statewide in 2005, Missouri received 128 confirmed and probable cases of RMSF, which surpassed the combined reports for Missouri's other tick-borne diseases (ehrlichiosis, tularemia, and Lyme disease). This represents a statewide incidence rate of 2.2 cases per 100,000 for RMSF, which is more than double the median number for the previous five-year period.

Missouri's rate of RMSF has generally been higher than the national rate since 1996, except in 1998 when it dipped to the lowest rate in 10 years. Since then, the rate has increased from 0.09 per 100,000 population in 1998 to 2.22 in 2005, well above the national rate of 0.58 in 2004. The continuing increase may be related to lifestyle and/or environmental factors that increase individuals exposure to ticks (such as travel to the countryside, involvement in outdoor activities, as well as urbanization of rural areas). In addition, there appears to be a greater awareness of tick-borne illness among physicians, particularly in light of the potential for the life-threatening consequences of delayed or missed diagnosis of RMSF. This growing awareness and concern may also contribute to the increased use of commercially available diagnostic tests, which have the ability to detect current or past infections.



Additional Website Resources

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Section A - Communicable Disease Surveillance

Shigellosis

Click to View
Spot Map
Relative Rate Map

Shigellosis is an infectious disease caused by a group of bacteria called *Shigella*. Most who are infected with Shigellosis develop diarrhea, fever, and stomach cramps starting a day or two after they are exposed to the organism. Stools are frequent, loose to watery, of small volume and often mucoid and/or bloody. The diarrhea is usually self-limiting, resolving in 5 to 7 days. Young children and the elderly may be more severely affected, in some cases needing hospitalization.

Humans are the primary source of this infectious disease, however, other animals can carry or pass *Shigella*. Shigellosis is transmitted by the fecal – oral route. When those who are infected fail to adequately wash their hands following a bowel movement, they subsequently transfer the organisms to food or objects that are ingested or placed in someone else's mouth. The infectious dose is quite small, from 10 to 200 organisms, compared to 10^7 organisms for *Salmonella.* For this reason, it is extremely easy to spread shigellosis from person to person.

Statewide in 2005, Missouri recorded 1,017 confirmed and probable cases of shigellosis. This represents a statewide incidence rate of 17.7 per 100,000, more than three times the median incidence rate for the previous five years of 5.5 per 100,000.

Table 1. Shigellosisi—Comparative Statistics, by Socio-demograph Category, Missouri[1]

	Case Count: 2005	% of Total	Rate*: 2005	Median Case Count: 2000-2004	% Change from 5-Year Median
Total	1017	100.0%	17.7	324	213.9%
Sex					
Male	451	44.3%	16.0	145	211.0%
Female	553	54.4%	18.8	179	208.9%
Unknown	13	1.3%	N/A	0	**
Race					
White	360	35.4%	7.3	127	183.5%
Black	286	28.1%	42.0	43	565.1%
Other	8	0.8%	6.8	1	**
Unknown	363	35.7%	N/A	153	137.3%
Age Group					
<1	30	3.3%	43.8	20	70.0%
1-4	306	30.1%	104.2	102	200.0%
5-14	392	38.5%	51.0	101	288.1%
15-24	60	5.9%	7.2	19	215.8%
25-39	145	14.2%	12.6	46	213.0%
40-64	70	6.9%	3.7	33	112.1%
65+	11	1.1%	1.4	3	**
Unknown	3	0.3%	N/A	7	-57.1%
Region					
Central	7	0.7%	1.1	13	**
Eastern	79	7.8%	3.6	256	-69.1%
Northwest	819	80.5%	54.6	42	1850.0%
Southeast	0	0.0%	0.0	5	**
Southwest	112	11.0%	11.6	8	**

[1]Socio-demographic are missing for some cases.
*All rates are calculated per 100,000 using 2004 population estimates provided by MDHSS, Bureau of Health Informatics.
**Percent of change is unstable if either the 2005 case count, the median case count, or both are fewer than 10.
Data Source: Missouri Health Surveillance Information System.

Section A - Communicable Disease Surveillance

Shigellosis - Continued

During nearly all of 2005, the Kansas City metropolitan area (KCMA) was inundated by an outbreak of shigellosis. From January 1 to December 31, 2005, the Northwest Region had 819 confirmed and probable cases of shigellosis. The average for the previous five years was 87 cases per year, including 295 cases in 2000**.** The 5-year median was 42. Of the 819 cases, the 6 health department jurisdictions in the KCMA (Cass, Clay, Independence, Jackson, Kansas City, and Platte) accounted for 680 (83%) of the cases.

Ray and Lafayette counties, which border KCMA on the east, accounted for another 104 (13%) of the total. The two Kansas counties that border KCMA on the west (Wyandotte and Johnson) accounted for the majority of cases of shigellosis reported in Kansas during 2005. Pulsed field electrophoresis (PFGE) analysis of the cases on both sides of the state line indicated that they were closely related strains. They also showed similar antibiotic resistance patterns, being resistant to the drugs most commonly prescribed to control shigellosis.

The vast majority of cases were in children. The preschool age group (≤5 years of age) represented 43% of the cases. Elementary age children (6-10) represented another 29%. Adults (>18) represented 23%. The children were evenly divided by gender, but females outnumbered males in the adult category by nearly 3 to 1.

A study by a Federal Centers for Disease Control and Prevention (CDC) Epi-Aid team revealed that over 80% of the cases in the KCMA had some type of daycare involvement. Several things stand out from that study. The frequency of hand washing is an important aspect. Children should wash their hands upon arrival at the center, after visiting the bathroom, before eating, after coming in from playing outside, and just before going home. Having easy access to hand washing was of the utmost importance. Rates were lower in centers where there was a good hand washing sink in each room that held children. In addition, rates were lower in rooms where there was a well-designed diapering area in each room with diapered children.

Each case of shigellosis comes with a cost. The CDC study estimated the financial burden of missing work, either with illness or to stay home with ill children, lost revenue for the daycare centers, medical expenses, and the public health and laboratory costs involved with investigating these cases, placed the estimated cost on citizens at well over $1.5 million. While that is a significant expense, it pales in comparison to the hundreds of children and their parents that went through the discomfort and anguish of this disease.

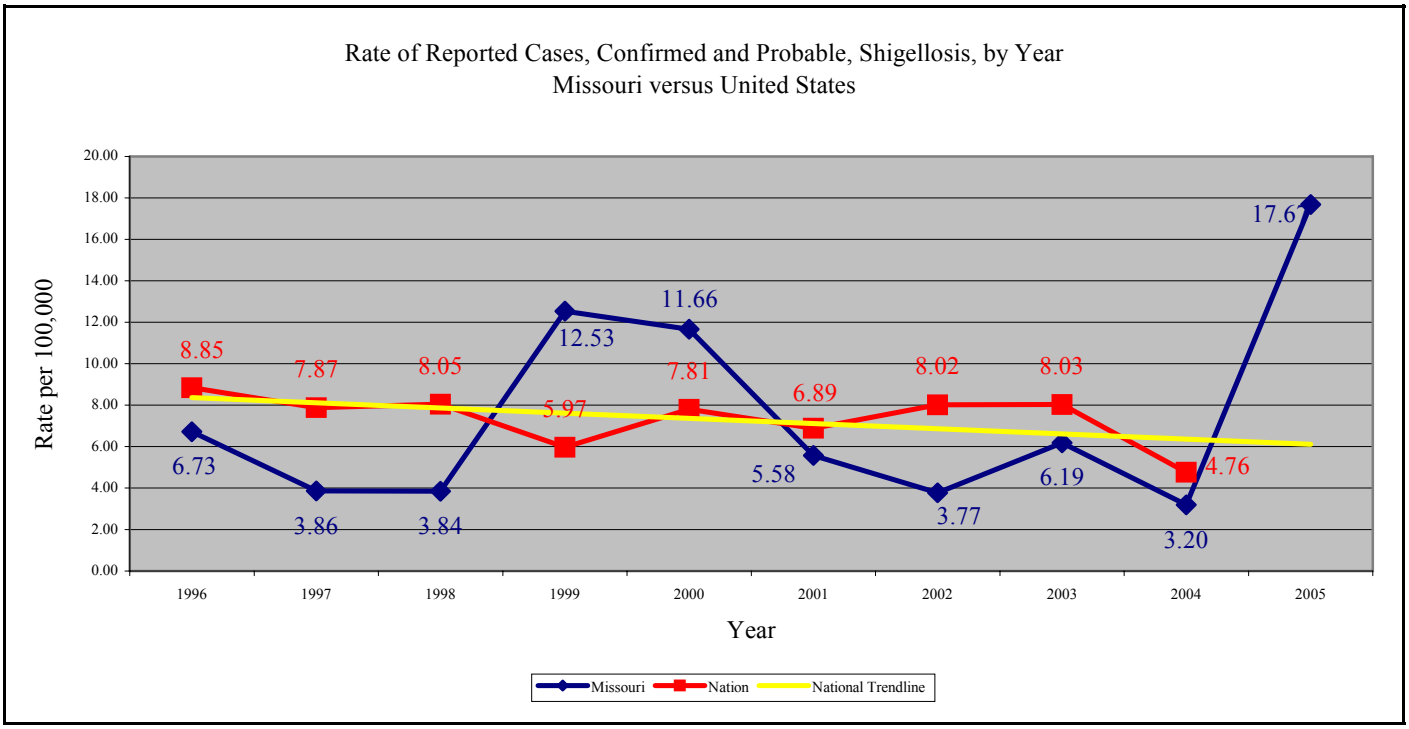
The efforts of many public health employees in all of the local health departments, the regional offices, the state public health laboratory, the Bureau of Communicable Disease Control and Prevention and the CDC combined to combat this disease and look into the routes of transmission with the KCMA. It was one of the largest public health investigations and control activities for Missouri in 2005.

Section A - Communicable Disease Surveillance

Shigellosis - Continued

The rate of shigellosis in the United States has been generally stable over the past decade. For the years 1996 through 2003, the rate per 100,000 population varied from 6.0 to 8.9 with a mean of 7.9 and an average of 7.7. In 2004, the last year for which national data is available, the rate dropped to its lowest level in a decade, 4.76.

By contrast, the median rate per 100,000 in Missouri from 1996 through 2004 was 5.6 with an average of 6.4. However, it has varied widely from lows below 4 in 1997, 1998, 2002 and 2004 to highs of 12.5 and 11.7 in 1999 and 2000, respectively. These peaks were the result of regional outbreaks, mostly associated with daycare and elementary-age children and adult females, often the mothers of children with the disease. Likewise, in 2005, Missouri ranked second in the United States in cases of shigellosis per capita, with a rate of 17.67 per 100,000. Again, this was the result of regional outbreaks, predominantly associated with daycare and elementary-aged children and their caregivers.



Additional Website Resources

CDC Health Topics
CDIRM
Health Region Defined

Section A - Communicable Disease Surveillance

Click to View
Spot Map
Relative Rate Map

Tuberculosis

TB, or tuberculosis, is a disease caused by bacteria called *Mycobacterium tuberculosis*. The bacteria can attack any part of your body, but it usually attacks the lungs. TB is spread through the air from one person to another. The bacteria are expelled into the air when a person with TB disease of the lungs or throat coughs or sneezes.

People who become infected with TB bacteria usually have had very close, day-to-day, contact with someone who has TB disease (e.g. a family member, friend, or close co-worker). You are not likely to get infected from someone coughing in line at a supermarket or at a restaurant. Dishes do not spread TB, nor do drinking glasses, sheets or clothing. In most people who become infected, the body is able to fight the bacteria to stop them from growing. The bacteria become inactive, but they remain alive in the body and can become active later. This is called latent TB infection (LTBI).

Table 1. Tuberculosis, Comparative Statistics, by Socio-demographic Category, Missouri[1]

	Case Count: 2005	% of Total	Rate*: 2005	Median Case Count: 2000-2004	% Change from 5-Year Median
Total	108	100.0%	1.9	136	-20.6%
Sex					
Male	70	64.8%	2.5	90	-22.2%
Female	38	35.2%	1.3	46	-17.4%
Race					
White	60	55.6%	1.2	58	3.4%
Black	36	33.3%	5.3	62	-41.9%
Other	12	11.1%	10.2	16	-25.0%
Age Group					
<1	0	0.0%	0.0	0	**
1-4	2	1.9%	0.7	3	**
5-14	1	0.9%	0.1	3	**
15-24	12	11.1%	1.4	12	0.0%
25-39	23	21.3%	2.0	32	-28.1%
40-64	40	37.0%	2.1	45	-11.1%
65+	30	27.8%	3.9	41	-26.8%
Region					
Central	5	4.6%	0.8	7	**
Eastern	45	41.7%	2.0	61	-26.2%
Northwest	34	31.5%	2.3	39	-12.8%
Southeast	4	3.7%	0.9	11	**
Southwest	20	18.5%	2.1	18	11.1%

[1]Socio-demographic are missing for some cases.
*All rates are calculated per 100,000 using 2004 population estimates provided by MDHSS, Bureau of Health Informatics.
**Percent of change is unstable if either the 2005 case count, the median case count, or both are fewer than 10.
Data Source: Missouri Health Surveillance Information System.

Assuring that all TB disease patients in Missouri complete their treatment is the #1 priority. Treating a patient with TB disease requires at least six months of multiple antibiotic therapy. The Department of Health and Senior Services provides TB medications to any resident of Missouri requiring treatment for TB disease or latent TB infection. Even though the number of reported cases continues to decline, we are faced with the following challenges:

Prevalence of TB among foreign-born person residing in the US

Over 35% of the Missouri cases are made up of individuals born outside of the United States. St. Louis County Health Department had 6 foreign-born college students diagnosed with TB disease in 2005.

Section A - Communicable Disease Surveillance

Tuberculosis - Continued

Delays in detecting and reporting cases of pulmonary TB
Statewide in 2005, Missouri had 5 cases of TB diagnosed at death, and 8 died during treatment. Most of these were from complications of advanced TB. Although the number of TB cases has declined, over a third of pulmonary cases continue to be diagnosed when they are late in the course of the disease. Early detection and reporting is critical.

The Missouri Rehabilitation Center (MRC) in Mt. Vernon serves as the state TB referral hospital and laboratory center. Eight beds on one wing of the hospital are devoted to caring for TB patients needing in-patient care. MRC hospitalized 12 patients on their inpatient TB unit in 2005.

Deficiencies in protecting contacts of persons with infectious cases of TB and in preventing and responding to outbreaks.
There were 2 TB outbreaks with extended contact investigations within Missouri in 2005. One of the outbreaks was in a child-care center in NW Missouri due to exposure to an infected child-care worker. Over 100 contacts were identified including child-care staff and children, fellow students and household contacts. Latent TB infection was identified in 5% of the contacts tested.

The second TB outbreak was in a rural county jail in SW Missouri. Three cases of active TB were diagnosed during this investigation. There were over 300 potential contacts that needed to be found and tested. Over 54 of the located contacts were infected with TB (LTBI).

One of the greatest challenges of TB control is locating, testing and treating all contacts to infectious TB cases. Younger TB patients tend to have a greater number of contacts that must be found for testing and treatment.

Presence of a substantial population of persons living in the US with latent TB infection who are at risk for progression to TB disease.
Suspected and/or confirmed TB disease is a reportable condition by law in Missouri. Missouri is one of several states that also require reporting of latent TB infection or LTBI. If an individual has a normal chest x-ray and a positive TST (tuberculin skin test) they are considered infected with TB and could benefit from treatment. Persons at greatest risk for exposure to TB would be: close contacts of a person with known/ suspected TB, foreign born from areas where TB is common, resident or employee of high-risk congregate settings such as jails, prisons, homeless shelters and nursing homes, and health care workers. Persons at higher risk for developing disease once infected include: HIV-positive persons, medically underserved and person with certain medical conditions.

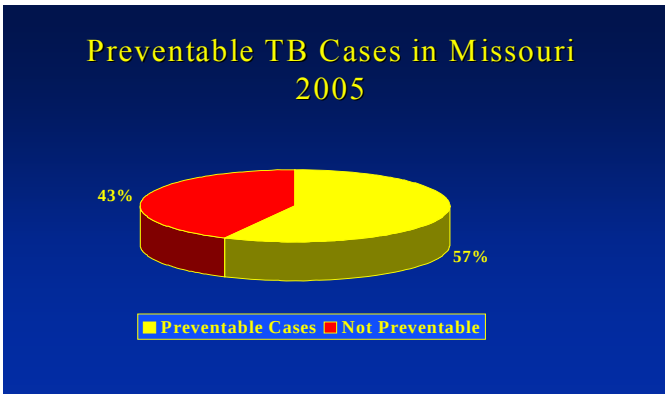
Missouri had 3,227 reported cases of latent TB infection in 2005. Approximately, 10% of these individuals could develop TB in their lifetime if not treated for latent TB infection.

Section A - Communicable Disease Surveillance

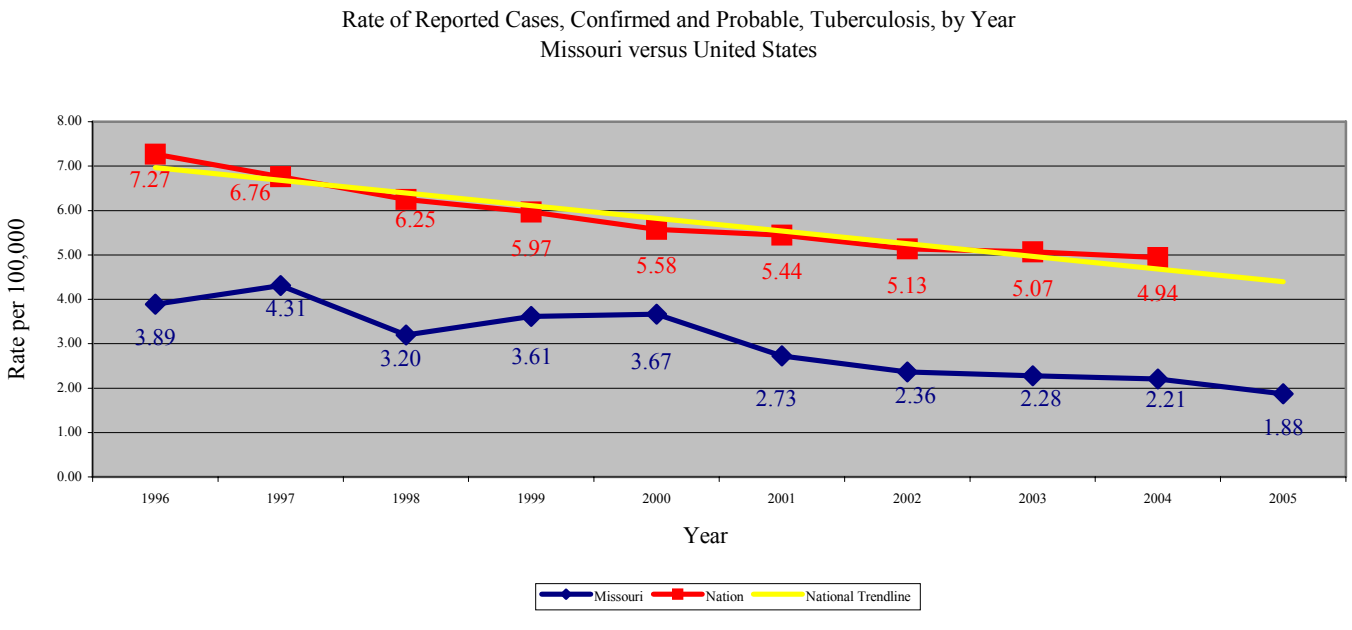
Tuberculosis - Continued

Maintaining clinical and public health expertise in an era of declining TB incidence.
In 2005, 57% of Missouri's TB cases were considered preventable. This indicates that more education must be provided to the medical community to encourage early diagnosis and treatment.

In 2005 a new continuous quality improvement program was initiated by the state TB program, which utilizes a Cohort Review Process to assess and improve the quality of diagnosis, treatment, prophylaxis and/or care of those infected with TB. Although it is too early to document the overall effectiveness of this process, it has been enthusiastically embraced by most of the participating Local Public Health Agencies throughout the state. The expectation is that this process will assist in addressing the issues discussed above.



Over the past 10 years, Missouri has seen a steady decline in the number of TB cases from 224 cases in 1996 to 108 cases in 2005. This follows the national trend of declining numbers for TB. It also represents a statewide incidence rate of 1.9 per 100,000, a decrease from the median incidence rate for the previous five years of 2.4 per 100,000. This is below the latest nationwide case rate for TB of 4.8 per 100,000 in 2004.



Additional Website Resources
CDC Health Topics | CDIRM | Health Region Defined

Section A - Communicable Disease Surveillance

Tularemia

Click to View
Spot Map
Relative Rate Map

Tularemia, also known as "rabbit fever," is a disease caused by the bacterium *Francisella tularensis*. Tularemia is typically found in animals, especially rodents, rabbits, and hares. Tularemia is usually a rural disease and has been reported in all U.S. states except Hawaii.

Typically, people become infected through the bite of infected insects (most commonly, ticks and deerflies), by handling infected sick or dead animals, by eating or drinking contaminated food or water, or by inhaling airborne bacteria.

Tularemia is a widespread disease in animals in the United States. About 200 human cases of tularemia are reported each year. Most cases occur in the south-central and western states. Nearly all cases occur in rural areas, and are caused by the bites of ticks and biting flies or from handling infected rodents, rabbits, or hares. Cases also resulted from inhaling airborne bacteria and from laboratory accidents.

The signs and symptoms people develop depend on how they are exposed to tularemia. Possible symptoms include skin ulcers, swollen and painful lymph glands, inflamed eyes, sore throat, mouth sores, diarrhea or pneumonia. If the bacteria are inhaled, symptoms can include abrupt onset of fever, chills, headache, muscle aches, joint pain, dry cough, and progressive weakness. People with pneumonia can develop chest pain, difficulty breathing, bloody sputum, and respiratory failure. Tularemia can be fatal if the person is not treated with appropriate antibiotics.

Table 1. Tularemia, Comparative Statistics, by Socio-demographic Category, Missouri[1]

	Case Count: 2005	% of Total	Rate*: 2005	Median Case Count: 2000-2004	% Change from 5-Year Median
Total	27	100.0%	0.5	28	-3.6%
Sex					
Male	20	74.1%	0.7	17	17.6%
Female	7	25.9%	0.2	11	**
Unknown	0	0.0%	N/A	0	**
Race					
White	18	66.7%	0.4	21	-14.3%
Black	0	0.0%	0.0	1	**
Other	0	0.0%	0.0	0	**
Unknown	9	33.3%	N/A	6	**
Age Group					
<1	0	0.0%	0.0	1	**
1-4	3	11.1%	1.0	1	**
5-14	4	14.8%	0.5	9	**
15-24	2	7.4%	0.2	0	**
25-39	1	3.7%	0.1	6	**
40-64	12	44.4%	0.6	5	**
65+	5	18.5%	0.7	6	**
Region					
Central	6	22.2%	0.9	7	**
Eastern	3	11.1%	0.1	4	**
Northwest	3	11.1%	0.2	5	**
Southeast	3	11.1%	0.6	2	**
Southwest	12	44.4%	1.2	10	20.0%

[1]Socio-demographic are missing for some cases.
*All rates are calculated per 100,000 using 2004 population estimates provided by MDHSS, Bureau of Health Informatics.
**Percent of change is unstable if either the 2005 case count, the median case count, or both are fewer than 10.

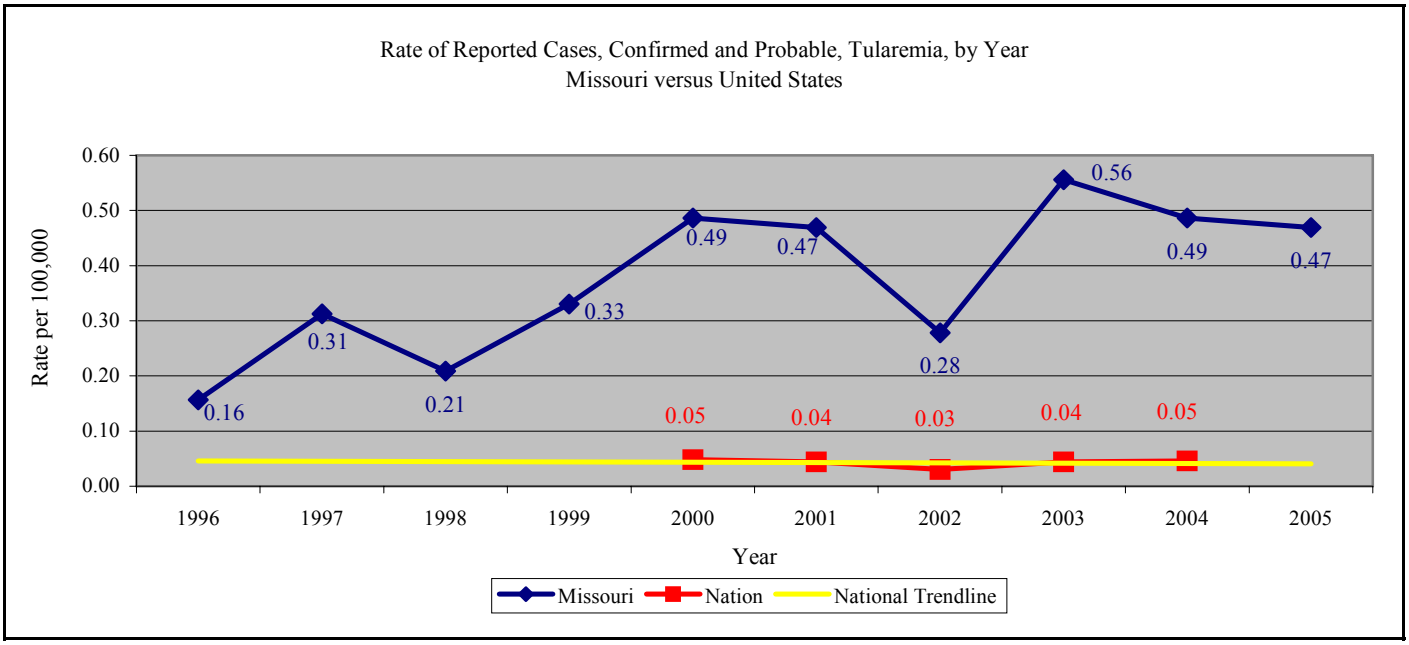
Section A - Communicable Disease Surveillance

Tularemia - Continued

Statewide in 2005, Missouri recorded 27 probable or confirmed cases of Tularemia. This represents a statewide incidence rate of 0.50 per 100,000, similar to 2004. Tularemia is endemic in certain regions of Missouri, which is evident when reviewing the Relative Rate Map.

In 2005 a change was noted in case distribution throughout the state. The Southwest Region accounted for 44% of the cases in the state (N=12). There was no outbreak or significant event that explains this shift. Tularemia is a potential agent for bioterrorism, each reported case was promptly investigated to assure it was a naturally occurring case. It should be noted that there has also been increased reporting for other tick-borne diseases including Rocky Mountain Spotted Fever. People can protect themselves from tickborne diseases such as Rocky Mountain spotted fever, tularemia, and ehrlichiosis by preventing tick bites.

From 2000 to 2004, Missouri's rate of reported tularemia has been, on average, nine times the national rate. (National data for 2005 was not available when this report was released.)



Additional Website Resources

CDC Health Topics
CDIRM
Health Region Defined

Section B– Missouri's Bio-Terrorism Surveillance

Missouri's Bio-Terrorism Surveillance

(Provided by the Office of Emergency Coordination)

The year 2005 was one of continuing evaluation of resources and focus for Bio-Terrorism Surveillance (BTS) in Missouri. With the advent of Local Active Surveillance and Web-Based Data Entry (WBDE) and improved analysis, the BTS system has become more representative, collaborative, automated, and accessible. WBDE provides capability for both collecting and sharing data with authorized personnel, including BTS Sentinel sites, Local Public Health Agencies (LPHAs), Epidemiologists across the state and other DHSS staff.

BTS Sentinel surveillance sites continue to be the foundation of the program. These sites are strategically located to ensure appropriate representation across the state as determined by population, key assets and geographic location and may consist of, but are not limited to, hospitals, clinics, physician practices and schools. These Sentinels provide daily syndromic data to the Bio-Terrorism Surveillance Team in Jefferson City.

Improvements & New Initiatives

By the end of 2005, 46 Sentinel sites (79%) used the WBDE option for reporting daily syndromic data. In addition, implementation of ESSENCE began in 2005. ESSENCE is a fully automated and integrated syndromic surveillance system used by the Department of Defense that will provide vital demographic information to rule out and identify the causes of aberrations and trends. ESSENCE will provide Bio-Terrorism Surveillance with the automated receipt of data and added abilities in the identification of harmful trends and aberrations that signal public health threats and bio-terrorist events.

Sentinel Site Reporting

In 2005, a total of 58 BTS Sentinel sites, submitted 17,667 BT Surveillance reports. This reflected an average of 25 reports per month by each site. By the end of 2005, 52 sites were reporting on a regular basis (Table 1). On average, sites reported 90 percent of the time in 2005. This is a steady increase over the past three years.

Table 1: BTS Sites by Type of Site and Participation

Type of Site and Participation		2005
CLINIC	Both	2
	Syndromic	1
	Total	3
HOSPITAL	Both	39
	Non-Syndromic	4
	Syndromic	1
	Total	44
PHYSICIAN	Syndromic	1
	Total	1
SCHOOL	Both	2
	Syndromic	1
	Total	3
URGENTCARE	Both	1
	Total	1
Total		52

Section B– Missouri's Bio-Terrorism Surveillance

Missouri's Bio-Terrorism Surveillance—Continued

Distribution of Data Collected

Syndromic data is reported across eight major categories (Table 2). The respiratory and gastrointestinal categories represent about two-thirds of the counts reported for all categories. The chemical and hemorrhagic categories represent the smallest shares of counts for all categories. Of note in 2005, the share of respiratory syndrome was up somewhat when compared to recent years, while the gastrointestinal and neurological syndromes were down slightly. The ILI (influenza-like-illness) category remained low in 2005 when compared to what was seen in 2003.

Table 2: Distribution of Syndromic Counts

	2003	2004	2005
Chemical	0.1	0.1	0.1
Fever	9.5	7.9	8.7
Gastrointestinal	22.3	25.5	23.3
Hemorrhagic	0.1	0	0
ILI	5.6	2.4	2.8
Neurological	12.6	14.1	12.5
Rash	4.3	5.1	4.6
Respiratory	45.7	44.9	48
Total	100	100	100

Data Aberrations

The accuracy of determining aberrations and/or elevated trends for both syndromic and non-syndromic data has increased since 2003. This has led to a reduction in superfluous flags and follow-up calls. In 2005, less than 0.9 percent of the reported counts in the major syndromic categories were determined as aberrations (Table 3).

Table 3: Percent of Reports with Data Aberrations by Category by Year

	2003	2004	2005
Chemical	0.50	0.55	0.65
Fever	3.32	0.76	0.92
Gastrointestinal	2.55	1.61	1.68
Hemorrhagic	0.34	0.31	0.16
ILI	3.41	0.35	0.88
Neurological	2.22	0.96	0.88
Rash	1.78	0.96	0.84
Respiratory	4.09	1.89	1.72
All Categories	2.17	0.82	0.87

The data aberration process for the BTS system uses two basic time groupings- month and day of week- to analyze the reported counts in terms of deviations from reported means. Simply stated, if reported counts exceed this defined statistical criteria, a flag is produced and then reviewed. This determines if it has already been identified by any other BTS partner, is a natural occurrence, such as the allergy season, or there is a need for follow-up.

Significant Findings

In 2005, there were 17,667 BTS reports submitted by Sentinel sites. These reports contained over 120,000 data points in relation to the 8 major syndromic categories (Table 3). Thus, the 0.87 percent of reports for all categories that contained data aberrations translated into 1,052 flags for further review. Of this total, 259 were determined to warrant a follow-up contact with the reporting site.

Section B– Missouri's Bio-Terrorism Surveillance

Missouri's Bio-Terrorism Surveillance—Continued

All chemical and hemorrhagic reported counts are forwarded to appropriate staff for follow-up with the reporting site, to determine if an abnormality has been seen that suggests exposure to a chemical or biological agent. All but two of the hemorrhagic reports in 2005 were due to reporting errors. One case reflected blood that grew pneumonia strep and progressed to "wet purpura" with bleeding out. The patient expired from severe sepsis. The other was diagnosed as idiopathic thrombocytopenic purpura.

In addition to the 250 chemical incident reports, another 250 cases of twelve different reportable diseases and several unusual rashes, school closures due to illness, etc, were identified for a total of 500 significant findings (Table 4).

Table 4: Significant Findings, 2005

	Number of Reported Cases
Acute Hepatitis	1
Carbon Monoxide Exposure	5
Chemical Reports	208
Chickenpox	16
Cryptosporidium	5
Heat Exhaustion / Stroke	6
Hypothermia	2
Influenza	250
Meningitis, Asceptic	1
Meningitis, Bacterial	2
Rocky Mountain Spotted Fever	1
Tularemaia / Possible Tularemia	1
Unexplained Petichia	2
Total	500

The purpose of Missouri's syndromic surveillance systems is to provide for early detection and notification. This allows us to provide advanced warning to public health and medical providers to rapidly implement control measures. However, it is not intended to replace the astute clinical practitioner's early recognition and prompt reporting of diseases or conditions. Missouri continues to work with our health providers to improve the syndromic surveillance system.

None of the above mentioned reports were determined to be bio-terrorism events.

Footnote: The analysis presented in this report contains information for only those sites that reported all of 2005.

Additional Website Resources

CDC Health Topics
DHSS Web Page
Health Region Defined

Glossary

Agent (of Disease) - A factor (e.g. virus, bacterium , parasite, chemical, or radiation) whose presence, excessive presence, or absence of, is essential for the occurrence of disease.

Bioterrorism - The intentional use of chemical, biological, or radiological agents as weapons during acts of violence or intimidation.

Case - A person or animal identified as having a particular disease.
Confirmed Case - surveillance definition, a case usually with positive laboratory results for the disease, generally associated with signs and symptoms of the disease.
Probable Case - surveillance definition, a case usually with a clinically compatible illness that is epidemiologically linked to a confirmed case.

Case Control Study - An epidemiologic study of persons with the disease of interest and a suitable control group of persons without the disease.

CD - Communicable Disease (or Infectious Disease) - diseases caused by biological agents such as a virus, bacterium or parasite.

Communicable - Able to spread disease from one person or species to another, either directly or indirectly; contagious.

ELC - Epi Laboratory Capacity Grant.

Epidemiology - The study of how and why diseases and other conditions are distributed within the population the way they are.

Epidemiologist - An investigator who studies the occurrence of disease or other health-related conditions or events in defined populations.

Epizootic - An outbreak of disease in an animal population that may also affect people.

Fecal-oral route - The transmission of an infectious agent by ingestion of feces.

Five-year Median - A data set which includes 5 consecutive year data totals where half of the elements have a larger value and half of the elements have a lesser value. The median can be thought of as the "middle" of the data.

Incidence - The number of new cases of a disease occurring in a population during a defined time period.

Incidence Rate - The rate at which new events occur in a population. For examples of the calculations, see page 41.

Incubation period - The time between exposure to an infectious agent and appearance of the first sign or symptom of the disease.

Mean - Commonly called average, is defined as the sum of the observations divided by the number of observations. For examples of the calculations, see page 41.

Median - The point in a data set where half of the elements have a larger value and half of the elements have a lesser value. The median can be thought of as the "middle" of the data. For examples of the calculations, see page 41.

Glossary

Morbidity - Having disease, or the proportion of persons in a community with the disease.

Mortality - Refers to death.

Nosocomial Infection - An infection occurring within an institution.

Outbreak - The occurrence of illness(es) similar in nature and clearly in excess of normal expectancy.

Pandemic - An outbreak occurring over a wide geographic area; widespread.

Pathogen - An organism capable of causing disease.

Pathogenic - Capable of causing disease.

PCR - Polymerase Chain Reaction. A laboratory procedure used to identify pathogens through amplification of genetic material.

PFGE - Pulse Field Gel Electrophoresis. A laboratory procedure of bacterial strain typing.

Prevalence - The total number of cases of a disease existing in a given area at any given time.

Preventable TB case

- A person with a previous positive TB skin test who is a candidate for treatment and not offered treatment;
- A person with a risk factor for TB who is never offered a TB skin test; and/or
- A secondary case to a preventable case.

Quartile - Any of three values which divide the sorted data set into four equal parts, so that each part represents 1/4 of the sample or population.

Risk Factors - The presence of any particular factor known to be associated with health related conditions considered important to prevent.

SDCEE - Section for Disease Control and Environmental Epidemiology

Serotype - To distinguish organisms on the basis of their constituent antigen(s).

Surveillance (of disease) - An ongoing mechanism to collect, analyze, interpret and distribute information.

Trend - Shows movement consistently in the same direction over a long time.

Vaccine - A suspension of attenuated live or killed microorganisms or fractions thereof, administered to induce immunity and thereby prevent infectious disease.

Zoonosis - A disease communicable from animals to humans.

Statistical Calculations

Examples of Central Tendency Calculation

Mean

Calculate the **mean** by adding all of the values and dividing the sum by the number of observed values (in this case 11).

55 + 12 + 60 + 46 + 85 + 27 + 39 + 94 + 73 + 5 + 60 = **556**

556 / 11 = **50.54545455**

The **mean** for this data set is **50.5** (result is rounded).

Median

The **median** is the element that falls in the middle of the ordered set. Rank the values from least to most:

5, 12, 27, 39, 46, 55, 60, 60, 73, 85, 94.

In this example the **median** is the sixth element in the set, which is 55.

5, 12, 27, 39, 46, 55, 60, 60, 73, 85, 94

Example of a Measure of Frequency Calculation

Incidence rates are calculated with the following equation:

(X divided by Y) multiplied by K

Where:
X is the number of cases for a specified time period
Y is the population (possibly exposed) for the same time period
K is a constant (often 1000 or 100,000) that transforms the result into a uniform quantity allowing comparison with other similar quantities.

Example: The Southwest Region has 86 cases of Hepatitis A in 1993, compared to 63 cases in the Central Region for that year. The 1993 population for the Southwest Region is 694,712, while the population for the Central Region is 621,740.

Southwest Region: **(86 / 694,712) * 100,000 = 12.4**
Central Region: **(63 / 621,740) * 100,000 = 10.1**

A comparison of the two incidence rates shows that in 1993 Southwest Region has a slightly higher incidence of Hepatitis A (12.4 reported cases per 100,000 population) than the Central Region (10.1 reported cases per 100,000 population).